

POPULAR ^{40 lock} Computing WEEKLY

35p

26 May-1 June 1983 Vol 2 No 21

This Week

Spectrum utilities

Tony Bridge weaves his way through a maze of utility programs including *Masterkey*, *Disassembler* and *Machine Code Test Tool*. See page 13.

Dragon keyboard

Peter Chase presents a m/c routine to enhance keyboard responses and extend the use of colour on the Dragon. See page 22.

ZX81 label maker

R Luxton explains how to make your own labels on the 16K ZX81 on page 17.

New releases

All the latest software releases including news of *Valhalla*, an animated graphics adventure for the Spectrum. See page 53.

★ STAR
Depth Charge
on Vic20.
See page 10.
GAME★

News Desk

Dragon goes across the pond!

DRAGON microcomputers will go on sale in America in August.

This is the result of negotiations, now in the final stages, between Dragon Data and the American manufacturer Tano, who will assemble, distribute and sell the computer in the US.

The American Dragons will be the first fruits of a new joint venture, set up by the two companies, called Dragon Tano Inc. Dragon Data holds a 49 percent share in the new company — Tano holds the remaining 51 percent.

Tano will begin by manufacturing 2,000 machines a week, supplemented initially by machines built by Dragon in this country.

The Dragon 32 will sell for \$300 (about £185) and the Dragon 64 will sell for \$400 (about £250). As well as being adapted to work with the US NTSC television system, the American Dragons differ from their UK relatives in that they

Continued on page 4

Softek compiler payments dispute

SILVERSOFT and Softek have clashed head-on in a dispute over royalty payments for a program written using a compiler.

The argument concerns the Silversoft program *Slippery Sid* which was written using the Super C Spectrum compiler from Softek.

Softek is claiming that Silversoft has infringed copyright and broken a contract of sale of the Super C program, by using the compiler to develop a commercial arcade game without permission. The company is insisting — and Silversoft is steadfastly denying — that a royalty payment must be made by Silversoft to Softek on every *Slippery Sid* tape sold.

Softek is now considering legal action, possibly involving an

injunction this week, to halt sales of the *Slippery Sid* program pending resolution of the dispute.

Softek's Tim Langdell explained that the Super C program — written by Andrew Glinster — is sold subject to the condition that it is not used to write commercial programs:

Continued on page 4



Classified

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer.
Ring 01-930 3266 and give us the details.

SPECTRUM GAMES. Three fabulously original 16/48K experiences on one illustrated £3 cassette. *Pyramid Panic*, *Beaststalk*, *Kong*. Fast multi-screen action, incredible hi-res multi-colour graphics, sound and music make this the best value quality games tape available. Guaranteed. Tim Boone, 1 Mercury Close, Southampton.

Classified

TEXAS TI 89/4A CASSETTE LEADS £4.95

INCLUDING POST
AND PACKING
Single Recorder only

Orders to:
Clares, 222 Townfields Road,
Winstford, Cheshire CW7 4AX
Tel: Winstford 51374



LINE RUNNER for Dragon. Fight a duel with the system, beware of the time walls, loops and vortex. Original arcade action, hi-res, colour and sound. Plus Super Breakout. Send £4.95 PO to: D. Goodchild, 2 Ryders Avenue, Westgate, Kent.

Classified

ORIC 1 CASSETTE LEADS WITH MOTOR CONTROL DIN to DIN or DIN to JACKS £2.95

Orders to:
Clares, 222 Townfields Road,
Winstford, Cheshire CW7 4AX
Tel: Winstford 51374



BOGGLE. Nationally advertised as world's most addictive game. Mind Boggler is superior Spectrum version with six skill levels and on screen recording. £3.50. Bobker, 29 Chadderton Drive, Unsworth, Bury, Lancs.

Classified

ATTENTION ALL DRAGON 32 and TANDY COLOR USERS!! "Color Computer News"

Our latest magazine from the USA, full of hints, ideas and software PLUS FREE 16K SUPPLEMENT with Dragon compatibility chart and free advisory service

Send £2.25 (and 57p s.s.s) for sample issue to ELKAN ELECTRONICS (Dept. FREEPOST, 11 Bury New Road, Prestwich, Manchester M25 6LZ. Telephone 061-788 7813 (24-hour service)

SUPERMAN. Outlaw, Missile, Command and Nightdriver, £40 each, postage included. Tel: Towcester 52202 after 6 pm.

Continued on page 8

★★ ADVENTURE COMPETITION — WIN A 64 ★★

WINDOW ON ANOTHER WORLD

NEW RELEASES

STAR JAMMER — Wiping the sweat from my brow, I searched the inky blackness, ahead for signs of enemy fighters. Through Star Jammer was the best ship in the galaxy, my dwindling energy reserves made me doubt I could reach the next stargate... (a one-player space arcade game requiring one joystick).

SUPER SKILL HANGMAN Hangman as you've never played it before! A vocabulary of over 1,000 words, three levels of difficulty and an optional timer make this classic word game a challenge for kids of all ages.

NIGHTFLIGHT — An accurate simulation of flying a single engine light aircraft. Nightflight allows for take-off, landing and aerial manoeuvres including loops and rolls.

SALAMANDER GRAPHICS SYSTEM — A comprehensive picture drawing system for the home computer enthusiast. Pictures in any mode or colour set, text on the hi-res screens and storage of pictures on tape. Requires one joystick.

ORIC TREK — A version of our classic Dragon Trek for the Oric-1! Ten levels of difficulty, three sizes of galaxy and more features than you can shake a Klingon at. A must for all Oric owners!

ORIC GAMES COMPENDIUM — Four exciting games for the whole family: Donkey Derby, Kingdom, Viper and Space Station.

DRAGON 32 and TANDY 32K (please specify):

Dragon Trek £9.95. Wizard War £7.95.
Golf £7.95. Grand Prix £7.95. Vulcan
Noughts & Crosses £7.95. Games Comp
D1 £7.95. Salamander Graphics System
£9.95. Super Skill Hangman £7.95. Star
Jammer £7.95. Nightflight £7.95.

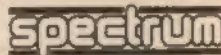
BBC MODEL B:

Dragon Rider £7.95. Tanks! £7.95. Games
Comp B1 £6.95. Games Comp B3 £6.95.
EDG Graphics (tape) £24.95. EDG Graphics
(disc) £29.95.
ORIC 1: Oric Trek £9.95. Games Comp 01
£7.95.

NOW AVAILABLE AT MAJOR BRANCHES OF:



AND



Mail Order (add 50p p&p) and Catalogues (send SAE) from:
Dept C, SALAMANDER SOFTWARE, 27 Ditchling Rise, Brighton,
East Sussex BN1 4QL. Tel: 0273 771942

Salamander Software

The Team

Editor
Brendon Gore

News Editor
David Kelly [01-930 3271]

Software Editor
Graham Taylor [01-839 2504]

Production Editor
Lynne Constable

Editorial Secretary
Caroline Owen

Advertisement Manager
David Lake [01-839 2846]

Advertisement Executive
Alastair Macintosh [01-930 3260]

Classified Executive
Diane Davis [01-839 2476]

Administration
Theresa Lacy [01-930 3266]

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street,
London WC2 7HF
Telephone: 01-839 6835
Published by Sunshine Publications Ltd.
Typesetting, origination and printing by
Chesham Press, Chesham, Bucks
Distributed by S M Distribution
London SW9. 01-274 8611. Telex: 261643
© Sunshine Publications Ltd 1983

Subscriptions
You can have *Popular Computing Weekly* sent
to your home:
UK Addresses
26 issues £9.98
52 issues £19.95
Overseas Addresses
26 issues £18.70
52 issues £37.40

How to submit articles
Articles which are submitted for publication
should not be more than 3,000 words long. The
articles, and any accompanying programs,
should be original. It is breaking the law of
copyright to copy programs out of other maga-
zines and submit them here — so please do not
be tempted.

All submissions should be typed and a double
space should be left between each line. Please
leave wide margins.

Programs should, whenever possible, be
computer printed.

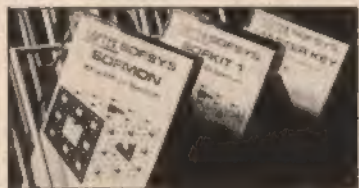
We cannot guarantee to return every submit-
ted article or program, so please keep a copy. If
you want to have your program returned you
must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekly cannot accept any
responsibility for any errors in programs we
publish, although we will always try our best to
make sure programs work.

This Week

News	5
Timex dispute.	
Letters	7
Lending libraries	
Star Game	10
Depth Charge on Vic20 by R Irvine	
Reviews	13
Tony Bridge looks at Spectrum utilities	



Programming	17
Label maker on 16K ZX81	
Spectrum	18
The Pit — part 2	
Dragon	22
Improved keyboard response	
BBC in education	26
Analysis of variance	
Open Forum	33
Six pages of your programs	
Adventure	45
Tony Bridge looks at <i>The Valley</i>	
Peek & poke	47
Your questions answered	
New releases	53
Latest software programs	
Competitions	55
Puzzle, Top 10, Ziggurat	

Editorial

The decision to hold a General Elec-
tion on June 9 has resulted in the
death of the Data Protection Bill. With
insufficient time left to pass the Bill
before the dissolution of the present
Parliament, the government decided
to drop it.

The Data Protection Bill, you may
remember (*Popular Computing Week-
ly*, 31 March — 6 April), was bitterly
opposed by a variety of groups includ-
ing the British Medical Association
and the Law Society.

However, it looks likely that the Bill
will be resurrected after the election
if the Tories are re-elected.

Opponents of the Bill are not
against data protection legislation as
such, but they are concerned that
there should be adequate safeguards.
The old adage of garbage in/garbage
out is particularly applicable. If there
are no checks on what goes into a
computer, there will be few on what
comes out.

Perhaps there is a need for some
sort of data protection ombudsman —
an independent guardian conversant
with the intricacies of computer re-
cords.

Data protection is an extremely
thorny subject, but it is one that will
affect all of us. The time to lobby the
government for adequate safeguards
is now — it will be too late once a new
Bill has been passed.

Next Thursday

See if you can avoid the aliens in this
Invader's type action game, where you
are the city bomber trying to keep clear
of the flying anti-matter disc! New York
— next week's *Star Game* for the 16K
Spectrum by P. Watson.

Subscribe to Popular Computing Weekly

I would like to subscribe to *Popular Computing Weekly*.

Please start my subscription from the issue.

UK Addresses: ☐ 26 issues at £9.98 ☐ 52 issues at £19.95

Overseas Addresses: ☐ 26 issues at £18.70 ☐ 52 issues at £37.40

Please tick relevant box

I enclose my cheque to *Popular Computing Weekly* for

Name

Address

Please send this form, and cheque, to *Popular Computing Weekly*, Subscription Dept., Hobhouse Court, 19
Whitcomb Street, London WC2 7HF.

Compiler dispute

Continued from page 1

"If it is used in this way then the software house must reach agreement with us over a royalty payment. This is individually negotiated with each software house concerned, but is typically around five percent of the wholesale price.

"We think that this is a small price to pay for the saving that the *Super C* program makes in terms of the time needed to create a machine-code program.



Andrew Glaister

"If this is unacceptable, then the purchaser can send it back and we will refund the money.

"Silversoft bought our compiler in December and used it to produce the *Slippery Sid* program, without negotiating a royalty payment with us.

"What they appear to be saying is that they don't agree with the idea of royalties on compilers."

Softek claims copyright has been infringed in the so-called run-time routines in the *Super C* program that are used in the *Slippery Sid* program. Explained Tim: "Our compiler is different from other compilers found on main-frame and mini-computers. *Super C* produces a sort of mini-Rom. Instead of calling routines from the Spectrum's Rom it uses its own — which actually form part of any program written using the compiler. When a character is printed on the screen it is our run-time routine that does that."

Silversoft's David Patterson vigorously denies that any copyright has been infringed or contract breached in Sof-

tek's compiler: "Tim's main argument is that his compiler goes through a two-stage operation. The main compiler takes the Basic source code and converts it into machine-executable code. The second part of the program then executes it. He is claiming that because the executive code is an integral part of the program then we are in breach of his copyright. That is like trying to sell a paint-brush without a handle.

"We have absolutely no intention of paying a royalty to Softek on each *Slippery Sid* tape sold, and if he wants a fight then he's picked the right company.

"We bought his compiler by mail-order and there was no mention that Softek wanted to charge a royalty on programs developed using it in the mail-order advertisement — at the point of sale.



David Patterson

"When you write a programming tool like a compiler you either keep it to yourself or put it in the public domain. Trying to charge a royalty on programs written with it is laughable. We have no intention of doing anything about his request for a royalty and if he wants to sling mud — let him go ahead."

● Andrew Glaister, who wrote the *Super C* program for Softek, is a former Silversoft programmer. He wrote *Orbiter* for them last year. He receives 25 percent of any income gained by Softek on the *Super C* compiler, either through sales of the compiler itself or from royalties on programs written using it.

patible computer which they import from the Far East and they will use the dealer network set up for that product to sell the Dragons. At the same time we will hope to expand the network to pick up a considerable number of new dealers."

Tano is based in New

Design your own Forth micro!

POTENTIAL purchasers of a new Forth microcomputer are to be consulted over the final design of the machine.

The new machine, as yet unnamed, will be designed and manufactured by Remsoft and Advanced Test Systems.

It will run Forth, be priced between £300 and £500 and the first prototypes should be working by the end of June. The computer will be 6502-based with either 64K or 128 K Ram, 16K Forth 79 Standard Rom and an on-board disc operating system for Sony 3½ inch 70 track micro floppy disc drives.

Other features are yet to be determined and will be decided by potential purchasers of the machine. Advertisements will be placed in a variety of magazines inviting members of the public to fill out a questionnaire to help determine the final specification of the new machine. It will probably have an RS232, Centronics and RGB outputs, have a bit-mapped screen display in eight colours and a second Rom port.

Remsoft already supplies a range of software for the Jupiter Ace Forth micro and plans to convert much of this material for the new machine in time for its launch later in the year. A word processing package and database program are also planned.

Explained Paul Wynter of Advanced Text Systems: "It is an experiment but, for the first time, the public will play a part in the design of a machine they might buy."

"The design is an up-rating of an existing 6502 board that we currently manufacture. The exact form of that up-rating is still very much undecided — and what form it will take depends very much on the results from our questionnaire."

If you would like to take part in the survey then write for your questionnaire to Remsoft, Freepost, Brighton BN1 1ZW.

Cyborg disc drive versions under way



CYBORG'S 5¼ inch disc drive is now working with the ZX81, Spectrum and Oric computers and work is under way on versions for the Vic20, Commodore 64 and Dragon.

The system's claim to fame is that the discs are transportable from machine to machine involving only a change of connector. This is possible because the disc operating system is designed with its own 6500/12 processor on board and the operating system software need therefore not be compatible with the host micro (see Popular Computing Weekly, May 5).

The system should go into production some time in late June.

Dragon drop their prices

DRAGON Data has cut the price of the Dragon 32 computer from £199.50 to £175.

First to react was Boots who introduced the new pricing last week and other retailers are expected to follow.

The price drop is recognised as a reaction to cost cutting two weeks ago of the Sinclair Spectrum machines. Boots' merchandising controller, John Flatman, commented: "It is a general trade price reduction which we think retains the correct price differential between the Dragon and the Spectrum."

Orleans and began by manufacturing control systems for the oil, gas and shipping industries.

Dragon has been looking for a suitable US manufacturer since the autumn of last year and the computer was first exhibited over there at the Comdex Fair in Atlanta this year.

Across the pond

Continued from page 1

are equipped with an RS232 interface as standard.

Tony Clarke, Dragon's managing director, explained the strategy for the US: "Tano already sell an Apple com-

Low-cost networking



A LOW-COST simple 'networking' system for any machines that load from an ordinary cassette player is available from Network Computer Systems.

The Multiload system makes use of a computer's Save and Load commands to direct programs from one machine to another.

No facility is provided to protect against message collisions but a four-computer arrangement costs only £6.95. Additional connecting cable costs around 50p per metre.

The system will only transfer information satisfactorily between computers of the same type, but will work with ZX81s, Spectrums, BBCs, Orics and Aces.

Details from Sue Clarke, Network Computer Systems, 39 Bampton Road, Luton, Beds.

Timex dispute at an end

THE sit-in by 350 workers at the Timex plant, which had halted development work on the Sinclair Research flat-screen tv project, has ended.

Normal working is due to be resumed this week, bringing to an end a dispute which has lasted for more than six weeks. Union officials of the AUEW and TASS have accepted an agreement involving 425 more job losses, delayed for 90 days.

Clive Sinclair commented that he was "absolutely delighted" that the dispute has been resolved.

Now it's Ms Pac-Man!

IF you hoped you had seen the last of Atari's gobbling Pac-Man then you will be disappointed.

Now the company is offering a follow-up — Ms Pac-Man. Atari claims "this little lady is a screen sensation, more dynamic and more talented than even Pac-Man himself".

Ms Pac-Man is a cartridge for the Atari VCS and costs £29.99.

Sinclair joystick option

THE Sinclair Research Rom cartridge adaptor (see *Popular Computing Weekly*, May 19) will also operate as a joystick interface.

The joystick port has been in the pipeline for some time. Indeed, some software packages from Psion — *Hungry Horace* for example — contain the necessary software hooks to run with the joystick.

● There is still no sign of the Sinclair £40 microdrives — originally mooted over a year ago. Although much of the development work is now complete, industry sources suggest that Norfolk-based DK Tronics has been brought in to assist with the project.

Argus cassette magazine

ARGUS Specialist Press, publisher of *Computer Today*, *ZX Computing* and *Micro Update*, is to launch the first magazine for computer users written entirely on cassette.

The cassette magazine —

Memory expansion boards for the BBCs

JOHN Richardson Computers plans a range of add-on memory expansion boards for the BBC microcomputer.

The company will sell 64K and 128K boards which, just like a Ram pack, simply plug into the computer via the 1MHz bus.

Although not addressable from the machine's Basic, the memory is seen by the computer as a 'book' of pages each containing 256 bytes. Access to the pages is via machine-code *Peeks* and *Pokes*. Just as with an array, it is possible to *Peek* in and *Poke* out of the pages keeping track of the page number.

The pages can be used to store data or sections of completed programs. Four pages can be linked together to hold a single screen of information. Such a technique could hold

displays used in simple animation or perhaps locations in a graphics adventure.

"The big limitation with the BBC machine," explained company founder, John Richardson, "is its memory. The advantage of our system compared with loading information off discs is speed. We can use a full 64K to store something like a mailing list or telephone directory in alphabetical order and get out data much quicker than is possible with a disc."

The 64K board should be available by the end of June and will cost around £140. The 128K board will follow at a price in the region of £175. More details from John Richardson Computers Ltd, Unit 337, Walton Summit, Bamber Bridge, Preston, Lancs.

Oric joins up with Cosmic in the Orient!

ORIC has formed a new company to manufacture and sell its computers in Japan and South East Asia.

The new venture — Oric Japan — is half-owned by Oric Products and half-owned by a consortium including one of Oric's far east manufacturers and Cosmic, a Japanese retail chain.

Oric's manufacturers are making the necessary changes

to the machine to operate with Japan's NTSC television system and Oric are also developing software which will run using the Japanese Kana character set.

Sales of the Oric computer in Japan are planned to commence in July.

● It is also hoped that a version of the NTSC Oric will be produced by the same manufacturer for sale in the US.

Microfairs to be held in June

THE beginning of June sees shows in London for both Sinclair and Commodore.

The 7th ZX Microfair will be held at Alexandra Palace on Saturday, June 4. Entry costs £1 and the fair will be open from 10 am to 6 pm.

Spectrum Computing — is for Spectrum owners and is compatible with both 16K and 48K models. The first issue — May/June — contains over 80K of programs and software reviews presenting on-screen extracts from the games.

Spectrum Computing will be published bi-monthly and will be available from W H Smith and John Menzies, price £2.99.

The 4th International Commodore Computer Show will be held at the Cunard International Hotel, Hammersmith from Thursday, June 9 to Saturday, June 11. Again, entry costs £1 and the show will be open from 10 am to 6 pm on Thursday and Friday and from 9 am to 5 pm on Saturday.

Texas price reduction

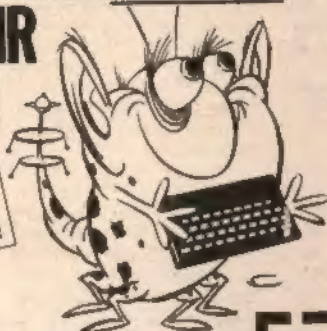
Correction: To take full advantage of Texas Instrument's special price deal for the 99/4A computer (see *PCW*, May 19) it is necessary to buy a selection of software cartridges.

To get a free Speech Synthesiser — worth £49.95 — or cassette recorder, you must also purchase six TI Rom software packs.

ZX MICROFAIR

THERE'S ROOM FOR
EVERYONE AT THE BIGGEST
ZX MICROFAIR
OF ALL TIME!

EVERYTHING FOR THE
SPECTRUM, ZX81 AND
MOST POPULAR MICROS!



BIG

Twice as big as the last show!

BIG

Even more exhibitors and interesting new computer products!

BIG

Plenty of space to move, eat, drink and relax!

BIG

Biggest value from any exhibition — admission £1 (50p for kids under 14)!

BIG

Choice of hardware, software, books, peripherals, programs — even a bring-and-buy sale!

BIG

Exhibition hall in parkland — big space — big car park!

BIG

Big choice of "how to get there" — rail, road, bus, tube, foot — see right!

BIG

Big day out for all the family!

BIG

Big savings on most manufacturers' "show offers".

CUT OUT AND KEEP HOW TO GET TO THE BIG SHOW.

By Road

Follow signs from the A1 (links with M1 and North Circular). Plenty of parking space available! Variety of routes from Central London.



By British Rail

From London (Kings Cross or Moorgate) — about every 10 minutes to Alexandra Palace station — free shuttle bus or short walk from there! From any part of the U.K. enquire from Kings Cross Travel Centre, London N1 8AP (phone 01-278 2477) about special day trips to the ZX MICROFAIR!

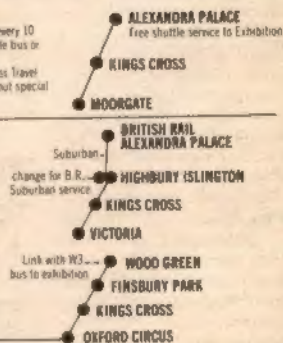
By London Transport

Underground: Victoria Line from Victoria (also Oxford Circus, Kings Cross/St Pancras) to Highbury and Islington — change across platform to BR Suburban Service to Alexandra Palace — free shuttle bus or 5 minute walk from there!

Alternative: Piccadilly Line (from Heathrow etc) to Finsbury Park or Wood Green — Link with W3 bus service to the fair.

HEATHROW

Piccadilly Line



Come to the
big one...

7th
ZX MICROFAIR
ALEXANDRA PALACE,
SATURDAY, JUNE 4th 1983

SATURDAY JUNE 4th at ALEXANDRA PAVILION, ALEXANDRA PALACE, WOOD GREEN, LONDON N22. FROM 10am to 6pm.

Advance tickets available from: Mike Johnston, 71 Park Lane, Tottenham, London N17 0HG. Adults £1.00. Kids (under 14) 50p.

Please make cheques payable to ZX MICROFAIR and enclose S.A.E.

LETTERS

Sensible solution?

I am writing to you on two subjects — the inevitable software library topic and the letter from Ashley Buss in your March 31 issue.

Dealing with the latter first, may I suggest to your reader that he refers to the Dragon manual (p. 17) for the easy method of listing programs, ie, pressing Shift and @ together to stop the list at any point and then pressing any key to continue.

On the subject of software libraries, I find the attitude of certain manufacturers hard to accept. I know that this is a young industry, but surely some sense must prevail soon.

Instead of trying to fight the libraries, why do the manufacturers not enter into agreements with them? A similar situation to this happened in the video industry until the major companies realised that the market was primarily interested in renting tapes. Consequently, instead of selling their tapes to dealers, the video companies entered into rental agreements.

Now, I know that renting a film is not quite the same situation as renting software, but there are similarities. It does not matter how good the software is, there comes a time when its appeal wears off, and then what happens? It is swapped or sold to a friend — albeit illegally.

I am a member of a software library, and I find its services invaluable. I have, in the past, bought several tapes (up to £10 each) that were of disgraceful quality and on these occasions have felt somewhat cheated out of my hard-earned cash. Bad software had in fact discouraged me from making purchases for some time.

This is where the software library comes in. If I obtain a poor program, I don't mind having wasted £1.50, and if I obtain a good program, I will support that company again in the future.

One of the most interesting points is that I spend the same amount of money renting instead of buying. Now, assuming that is the situation with everyone else, there must be the same amount of money going into the system. There-

fore, it is just a question of getting the distribution of this money right.

There seem to be two alternatives. Firstly, the manufacturers could rent libraries their tapes on a monthly basis instead of selling them. Secondly, manufacturers could charge the libraries about 50p every time they lend a tape.

I am sure that given a sensible arrangement, the only people to suffer would be the manufacturers of poor quality software, and that would be no bad thing!

Iain Mackenzie
16 Dudley Drive
Glasgow G12 9SB

Who's to blame?

I feel I must reply to the letter from A J Prestwich (*Popular Computing Weekly*, April 28-May 4) concerning his trouble with obtaining his 32K expansion from ELR for his issue 1 Spectrum.

I also own an issue 1 and have received and fitted an expansion from ELR, and I don't really believe ELR should take all the blame. Sinclair has released more issue 1s than it has led people to believe and I will be very interested to see if Sinclair produces an expansion for it. By the way, my expansion operates perfectly even after one stretch of eight hours non-stop use.

PS. I thought Clive Curry's Imagical Software letter was hilarious.

G Bloomfield
Britannia
7 Edmund Close
Downend
Bristol BS16 5EJ

Free reign with railcards!

Hot on the heels of sensational revelations in certain magazines last week, concerning software houses and the cars their employees drive, Bug-Byte's co-director Tony Baden has let it be known that he is awaiting delivery of a Reliant Robin, complete with "GT stripe". Sales Manager John Phillips and Assistant Sales Manager Barbara Smathers share a 1973 Mos-

wich van and newly appointed creative and artwork head Les Harvey is believed to have ordered a Skoda Estelle. "Even though it's a bit flash," he says.

The rest of the staff have unlimited access to all buses and trains. "We allow them a free reign with their student railcards," says Baden. "And our UK Office Manager, Matthew Thomas, who I believe is 12, has his sister's bike." Baden hopes the news will not upset the company's customers, "I'd hate them to think we were wasting their money," he said.

Stop Press. Harvey distraught. Estelle not available. Yugo ordered.

Matthew Thomas
Bug-Byte
100 The Albany
Old Hall Street
Liverpool L3 3AB

This letter follows a news item about Imagine Software and its new range of company cars in *Home Computing Weekly*, May 17-23. We are eagerly awaiting new developments in this Liverpoolian saga. Watch this space.

Extended life!

Users of microcomputers may have seen a parallel between computer software and what has been known as the "soul" of a person, occupying the body's computer, the brain. The conclusion may have been drawn that were it possible to somehow record the program from the brain, then immortality could result, if it could be played into a replacement body.

Such science-fiction may well become fact, but not within the lifetimes of many of those now living. However, some Americans have been exploring the ideas of cryonic suspension, where the bodies of deceased people are stored in liquid nitrogen until such time as the freezing damage, cause of death and ageing damage can be reversed.

Work is in progress to enable British people to take part in the cryonics program, and the cost needn't be high within life, as long as sufficient assets are available upon death to pay for suspension and stor-

age. As you can't take them with you, the perceived financial loss if this unproven process doesn't work needn't be high. An associated group is also working on ways to retard ageing now, and collates available scientific information as well as funding its own research. It has achieved much publicity from appearances on US television and the publication of a best seller, *Life Extension - A Practical Scientific Approach* (Pearson & Shaw, Warner, \$20, 1982).

I have been researching the cryonics and life extension programs, and can send free details to anyone interested.

John de Rivaz
West Town House
Porthtowan
Truro
Cornwall TR4 8AX

One Point Two

They do say that in a certain part of Cambridgeshire there is a creature strange called *One Point Two MOS*. 'Tis affirmed twas borne of an Acorn by the Good Fairie Beebeecce.

If all 'tis said is true, *One Point Two* is a wondrous benevolent creature, serving as page to many Roms, making men especial Word Wise. It doth destroy the many tiny vermin in cassettes and renders sundry things possible.

Time and again the wise men have joyously foretold the coming of *One Point Two* throughout the realm. They look deeply into their crystal balls but often and sadly do turn away, their cash tills silent.

I have conversed with travellers and those in far places demanding of them "what doth the creature resemble". Though many have heard tell of it, I have met none who have yet seen it.

Despairing then I will hie me hence to a monastery or a Sinclair or a Dragon or anywhere that reacheth specification. Ere I go I must forewarn my family, friends and neighbours against th'illusions of life and the Model B.

M G Goldsmith
2 Pulsborough Close
Georgetown
Braunton
Devon EX33 1JX

GEMINI

more programs

GEMINI SPECIAL FREE OFFERS
 3 for the price of 2 - SAVE £19.95!
 5 for the price of 3 - SAVE £39.90!
 7 for the price of 4 - SAVE £59.85!
 (CASHBOOK & FINAL ACCOUNTS
 NOT INCLUDED)



CASH BOOK ACCOUNTS PROGRAM FOR BBC 32K, TORCH, SPECTRUM 48K NEW £59.95

One of the most innovative business programs on the market. Replaces a manual cash book system, e.g. Simplex and 'All-in-One'. Written by practising Chartered Accountants, this practical program is simple to use and will replace your manual cash and bank records. By giving you access to vital management information as and when you want it, it will enable you to keep more positive financial control of your business.

The software is extremely well and lucidly documented, and Gemini provide a full technical back-up and product up-date policy. Take a look at the information this program will provide:-

- * Summary of VAT information for VAT returns
- * Cumulative receipts and payments report analysed over the standard

profit and loss and balance sheet headings * Option for departmental analysis of sales and purchases * Audit trail printout of all transactions. * Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors etc. * Trial balance at any interval * Interfaces to 'Final Accounts' program to produce balance sheet and trading and profit/loss account etc. * Spectrum version may be used with Sinclair OR 80 column printer.



FINAL ACCOUNTS PROGRAM FOR BBC 32K, TORCH, SPECTRUM 48K £59.95

Requires Cash Book module. This program will take your cash book data to the logical conclusion of balance sheet, trading and profit/loss account and notes to the accounts i.e. fixed assets, land and buildings and capital accounts. Final accounts (BBC version) links to 'Beeplot' for graphic data presentation.

Format: Torch disk, BBC disk/cassette, Spectrum cassette.

Special Offer - Cash Book and Final Accounts together - £95

"Gemini's range of software is in the vanguard of the releases for 'serious' micro users..."
 (WHICH MICRO AND SOFTWARE REVIEW)



INVOICES AND STATEMENTS... £19.95

Compatible with most micros. See table. Ideal for the small business. A complete suite of programs together with generated customer file for producing crisp and efficient business invoices and monthly statements on your line printer. All calculations include VAT automatically, and the program allows your own messages on the form produced. This program gives you superb presentation and saves time on one of the most tedious tasks in the office.



COMMERCIAL ACCOUNTS... £19.95

Compatible with most micros. See table. A gem of a program, all for cassette, with the following features:- Daily Journal. Credit Sales. Cash Sales. Credit Purchases. Purchases - other. Sales Ledger. Purchase Ledger. Bank Account. Year to date summary. A fully interactive program suitable for all businesses. Files can be saved and loaded and totals from one file carried forward to another on cassette. Particularly useful from a cash flow point of view, with an immediate accessibility to totals for debtors and creditors. Bank totally supported with entries for cheque numbers, credits and, of course, running balance.



MAILING LIST... £19.95

Compatible with most micros. See table. A superb dedicated database to allow for manipulations of names and addresses and other data. Gemini's unique 'searchkey' system gives you a further ten 'user-defined parameters' to make your own selections. Features include the facility to find a name or detail when only part of the detail is known. It will print labels in a variety of user specified formats.



DATABASE... £19.95

Compatible with most micros. See table. The program that everyone needs, the most valuable and versatile in your collection. Facilities include sort search, list print if required. Can be used in place of any card index application; once purchased you can write your own dedicated database to suit your particular needs with a limitless number of entries on separate cassettes.



STOCK CONTROL... £19.95

Compatible with most micros. See table. Dedicated software with all that's necessary to keep control of stock. This program will take the tedium out of stock control and save time and money. Routines include stock set up, user reference number, minimum stock level, financial summary, line print records, quick stock summary, add stock, delete/change record and more.



HOME ACCOUNTS... £19.95

Compatible with most micros. See table. Runs a complete home finance package for you with every facility necessary for keeping a track of regular and other expenses, bank account, mortgage, H.P., etc. This program also allows you to plot graphically by Histograms your monthly outgoings.



WORD PROCESSOR... £19.95

Compatible with most micros. See table. This program features routines found in much larger and more expensive packages with a typical word length of 5-6 letters it allows for around 1000 words in memory at one time. Ideal for the user who requires a simple program to write letters on his computer. Features include, block delete, block insert, search and replace, edit text, display text and more.

"Simple to use"
 "Ideally suited to the way most offices run....."
PERSONAL COMPUTER NEWS



SPREADSHEET ANALYSIS

BEEBCALC £19.95

DRAGONCALC £19.95

NEW

NEW **FOR BBC AND DRAGON 32.** Spreadsheet processors have proved to be important tools for using micros in business, scientific and domestic financial applications.

POSITION	A1	RC	SPACE	5185	T
	II	A	II	II	II
1	- J.B. SNOOKER T/A POT - BLACK				
2	PROJECTED CASH FLOW			YEAR	ENDED
3					
4				Oct.	Nov.
5				\$	\$
6	INCOME				
7	Sales			11786	10944
8					
9					
10	REVENUE EXPENDITURE				
11	Purchases			500	500
12	Advertising			500	1000
13	Director's salary			1596	1596
14	Salaries			2216	2216
15	Rent				
16	Telephone				300
17	Insurance				200
18	Printing, stationery				400
19	Repairs & renewals				
20	Hire of equipment			60	60
COMMAND BCDEFGPRSTW?					

Without any programming knowledge at all, you may:-

- Set up a computerised spreadsheet, with chosen row and column names.
- Specify formulae relating any row or column to any other.
- Enter your source data and have the results calculated.
- Save the results on tape (or disk—BBC) for later reloading and manipulation.
- Print the tabulated results in an elegant report format.
- Experienced users may access saved files and write their own reporting or graphics presentation programs for the results.

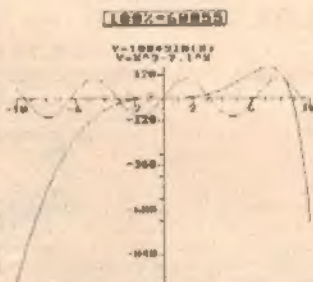
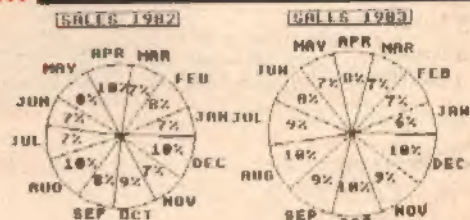
Some typical applications:--

- Small business accounting applications, e.g. profit and loss statements and cashflow projections, break-even analyses etc.
- Investment project appraisal – anything from double glazing to oil rigs!
- Comparing rent/lease/buy options.
- Processing the results of scientific experiments or field studies.
- Engineering calculation models.
- In fact, anything that involves repeated re-calculation of results presented in tabular or spreadsheet format.

Program Availability Chart:-

[illegible]**BEEBLOT & SPECTRUMPLOT £19.95**

NEW



Important new additions to the Gemini family. Present numeric and string data together in easily-understood pie chart, histogram or graph format. Beebplot has a built-in interface to Beebcalc, and both Beebplot and Spectrumplot have built in interfaces to the Final Accounts program of Cashbook. The facility for mathematical function

plotting is also provided. The BBC version has a high resolution screen dump for the Epson or CP-80 printers, and the Spectrum version dumps to the Sinclair printer via the 'copy' key. A very useful program that will give superb results either from direct input of data from the keyboard or via simple access to other software data files. A must for business and education.

Dealer/Trade enquiries invited – generous trade discounts for quantity.

**Special ACCESS card instant sales
hotline for prompt despatch...**

24 hr Answerphone Service.
All enquiries other than credit
card sales to 03952-5832

**Gemini. Functional Software Specialists. 9, Salterton Road,
Exmouth, Devon. EX8 2BR**

PLEASE SEND URGENTLY

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(Please note: Items as priced except BBC/TORCH DISKS: please add £4 extra for 40 track and £5 for 80 track format!)

Name _____

Address

Machine Type _____ Memory Size _____

enclose

Make cheques and postal orders payable to Gemini Marketing Ltd

Access Number: _____

Signature _____

Signature _____

Scopri

1000

100

MARKETING LIMITED

Gemini Functional Software Specialists.

9 Salterton Road, Exmouth, Devon EX8 2BR

Depth Charge

A new game for the Vic20 by Robert Irvine

In this game you are a warship patrolling the ocean, trying to clear it of enemy submarines. You move with the joystick, left, right, and use the fire button to drop a depth charge.

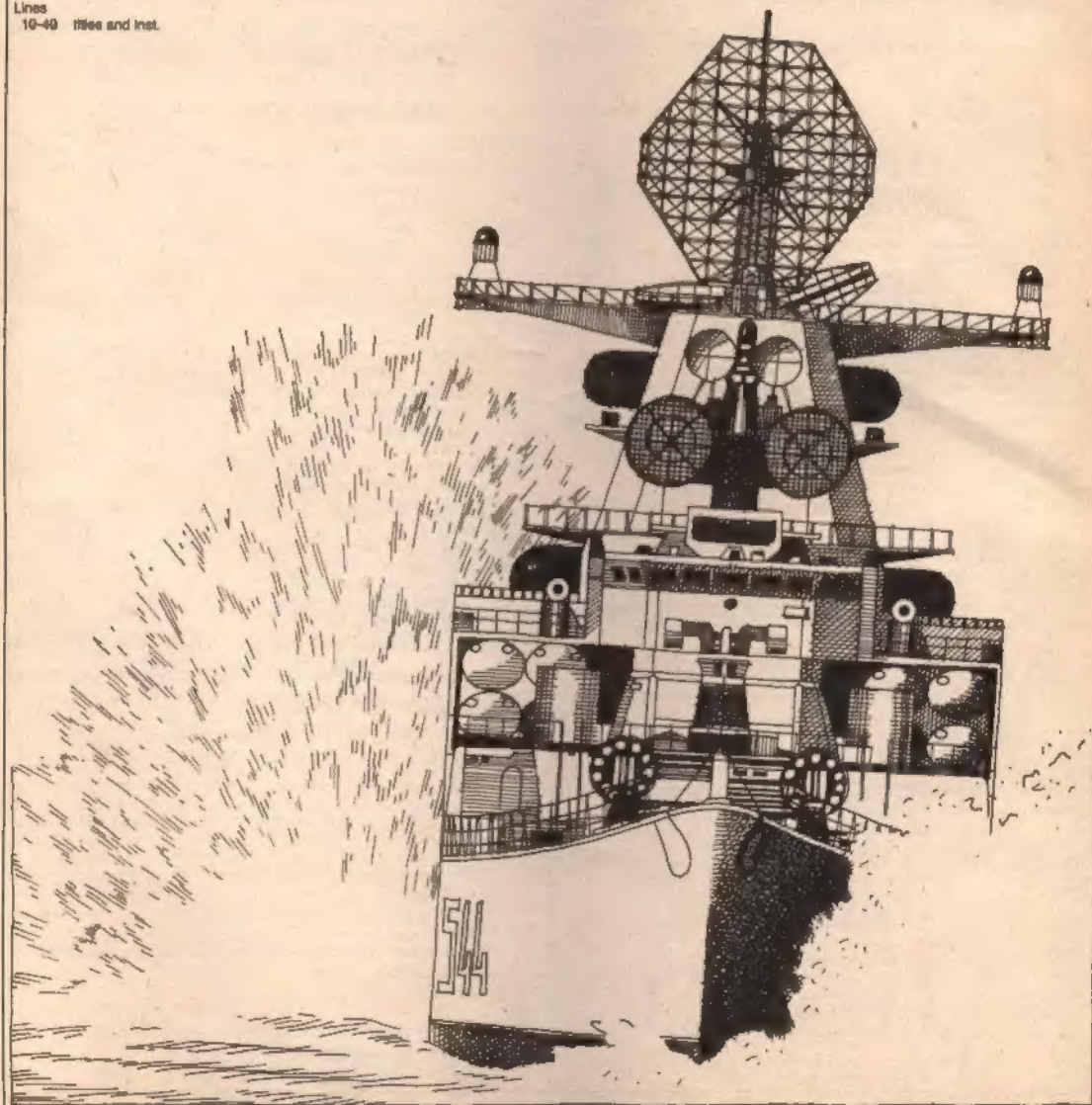
You have 20 depth charges to score as many points as possible. The lower a sub is in the water, the more points it is worth.

51-71 user def. graphics and joystick poke
100-130 set up screen and define variables
130-140 decide where sub comes from and print it on screen
151-170 joystick poke
170 checks if you have charges left
180 checks if you have hit a sub
190-230 firing sequence
300-320 sub hit routine
400-500 end graphics routine
500-530 end or restart routine

Variables used
dp — depth charge position
sp — ship position
sr — level of sub (depth)
sl — start location of 'sub' routine
se — end location of 'sub' routine
sv — score value (of sub)
sc — total score
fd — depth charge has fallen
vl — volume level (sound)
vv — volume level (sound)

Program notes

Lines
10-40 title and inst.



READY.

```

10 PRINT"DEPTH CHARGE"
15 PRINT"BY ROBERT IRVINE (C)"
20 PRINT"YOU CONTROL THE SHIP,"
25 PRINT"TRY TO 'DEPTH CHARGE' THE SUBMARINES THAT"
26 PRINT"MOVE BENEATH YOU."
27 PRINT"YOU HAVE 20 CHARGES."PRINT"THE LOWER SUBS SCORE"PRINT"MORE POINTS"
30 PRINT"GOOD LUCK!!"
35 PRINT"PRESS ANY KEY TO START"
40 GETPP$=INKEY$
41 IF PP$=" " THEN 40
51 POKE36876,220
55 FORV=7168TO7169:FORJ=71:READJT:POKEV,J:INEXTV
61 DATA0,0,0,0,0,0,0,0
62 DATA4,4,63,15,255,106,63,31
63 DATA128,128,248,224,225,235,254,252
64 DATA0,0,0,0,14,255,111,63
65 DATA64,224,236,232,232,235,246,252
66 DATA0,0,48,124,48,0,0,0
67 DATA255,255,255,255,255,255,255,169,148,74,170,53,210,74,89
68 DATA16,56,56,16,16,56,16,48
69 POKE36869,235:IF0=0:FD=22:DP=0:M=0:SC=0:DL=20
71 POKE37151,0:PA=37151:PB=37152:RB=37154
100 REM SET UP SCREEN
105 POKE36879,230:PRINT" "
110 FORJK=768TO8185:POKEJK,0:INEXTJK
115 FORH=38510TO38510+22:POKEH,0:INEXTH
116 FORLM=38532TO38905:POKELM,6:INEXTLM
120 PRINT" "
125 SP=7800
126 POKE$P,1:POKE$P+1,2
130 REM MOVE SUB
131 SR=INT(RND(1)*8):(FSR=<1DRSR)=0THEN138:SE=0:SL=0:K=0:U=0:Q=0:SO=0
132 VV=15
133 IFSR=2THENSRL=8142:K=1:U=1:Q=1:SO=20:SV=15:GOTO146
134 IFSR=3THENSRL=8052:K=-1:U=1:Q=-2:SO=-20:SV=10:GOTO146
135 IFSR=4THENSRL=7922:Q=1:U=1:K=1:SO=20:SV=5:GOTO146
136 IFSR=5THENSRL=8162:K=-1:U=1:Q=-2:SO=-20:SV=15:GOTO146
137 IFSR=6THENSRL=8032:Q=1:U=1:K=1:SO=20:SV=10:GOTO146
138 IFSR=7THENSRL=7942:K=-1:U=1:Q=-2:SO=-20:SV=5:GOTO146
140 REM PRINT SR
145 SE=SL+SO
147 IFSL<0THENSRL=SL+K:POKESL,3:POKESL+U,4:POKESL-Q,0
148 IFVV>0THENVV=VV-1
149 POKE36878,VV:IFSL=SETHENPOKESL,0:POKESL+U,0:POKE36878,0:GOTO131
150 PRINT"SCORE"SC:PRINT"CHARGES LEFT"DL" "
151 A=PEEK(PA):POKEPB,127:B=PEEK(PB):POKEPB,255
155 IF (BAND128)=8ANDF<1ANDSP<7810THENSPP=1:POKE$P,1:POKE$P+1,2:POKE$P-1,0
160 IF (BAND16)=8ANDF<1ANDSP>7790THENSPP=1:POKE$P,1:POKE$P+1,2:POKE$P-2,0
170 IF (BAND32)=8ANDDL>0THENF=1
175 IFDL=0THENGOTO400
180 IFF<1THENGOTO147
185 DP=SP+FD+1
186 IFPEEK(DP)<0ANDPEEK(DP)>5THENGOTO300
190 POKE$P,5:IFM=0THENPOKE$P-22,0
210 M=M+1:FD=FD+22
220 IFM=17THENDL=DL-1:POKE$P,0:IF0=0:FD=22:M=0:DP=0:GOTO230
230 GOTO147
300 POKE$P-22,0:POKE$P+1,7:POKE$P-1,7:POKE$P,7
310 POKE36876,0:POKE36877,220:FORL=15TO0STEP-1:POKE36878,L
315 FORLL=1TO100:NEXTLL:NEXTL:POKE36877,0:POKE36876,220
320 POKE$P,0:POKE$P+1,0:POKE$P-1,0
325 M=17:SC=9C+SV:SL=SE:GOTO220
400 POKE36878,0:POKE36876,0:POKE36877,120:VL=0
405 POKE$L,0:POKE$L+1,0:POKE$L-1,0
410 POKE$P,0:POKE$P+1,0:POKE$P-1,0
420 POKE7800,1:POKE7801,2
430 POKE8152,3:POKE8153,4
440 FORPM=8131TO7823STEP-22:VL=VL+1
445 POKEPM,0:IFPM+22<8153THENPOKEPM+22,0:POKE36878,VL
446 FORJJ=1TO100:NEXTJJ
450 NEXTPM
455 POKE7800,7:POKE7801,7:POKEPM+22,0
460 POKE36877,220
465 FOROU=15TO0STEP-1:POKE36878,OU
470 FORHJ=1TO150:NEXTHJ
480 NEXTOU
485 POKE7800,0:POKE7801,0:PV=0
490 POKE36878,0:POKE36877,0:POKE36876,220
495 VL=15:FORDB=8152TO8184:POKE$B,3:POKE$B+1,4:POKE$B-1,0:POKE36878,VL:VL=VL-0.
75
496 IFVL=0THENVL=15
497 FORL=1TO50:NEXTL
498 NEXTDB
499 POKE$B,0:POKE$B-1,0
500 POKE36876,0:POKE36878,0:POKE36869,240:POKE36879,27:PRINT" "
505 PRINT"YOU WERE ELIMINATED"PRINT"WITH A SCORE OF"SC"."
510 PRINT"ANOTHER GAME (Y/N)"
515 GETX$:IFX$=" "THEN515
520 IFX$="Y"THEN530
525 PRINT" "END
530 RESTORE:CLR:GOTO51

```


32K* RAM PACK FOR YOUR COMMODORE VIC20

SPECIAL OFFER

CHOOSE ANY ONE OF THE
FOLLOWING 'GEMINI' SOFTWARE
CASSETTES REQUIRING
32K MEMORY EXPANSION:

- 1 — DATA BASE MANAGEMENT
- 2 — STOCK CONTROL
- 3 — MAILING LIST
- 4 — INVOICE STATEMENTS
- 5 — HOME ACCOUNTS
- 6 — COMMERCIAL ACCOUNTS

AND ADD A 32K RAM PACK BY PLUS 80
(rrp £69.95 for both)

ONLY £59.99 (INCL)

PLUS 80 LTD
31-33 LOWER ROAD
HARROW
MIDDX HA2 0DE
01-423 6393

(Generous dealer discounts)

*Gives 28159 bytes

ALLOW 10-14 DAYS DELIVERY

NAME

ADDRESS

32K RAM PACK with Software ☐

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

32K RAM PACK on its own at £49.99 ☐

SOFTWARE on its own at £19.95 ☐

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

16K RAM PACK at £37.99 ☐

I ENCLOSE CHEQUE/PO FOR £

Programs for programs

Tony Bridge looks at the growing range of utilities for the ZX Spectrum

The vast majority of those people now buying home computers do so, apparently, to play games. Walk into the average software store, and the assistant will almost certainly ask you, "Which game would you like, Sir/Madam?"

But surely, sooner or later, the squeaks and explosions of the Invaders and Scramblers and hungry little Pacmen must pall for many people. It is then that the more serious programs come into their own.

The Sinclair Spectrum is particularly well-served in this area, as a well-trodden path for the Hobbyist has been forged from the ZX80, to the ZX81, and on to the Spectrum. The beauty of the Sinclair range is the excellent selection of software readily available for light relief, and the sheer — sorry about the jargon — "friendliness" of the machines.

So, in this review we shall take a look at some of the Utility programs — programs that make it easier for you to make your own programs work. In addition we'll look at Business Utilities — programs that make it easier for you to make your (small) business work.

Programming is a rather esoteric art, shrouded in mystery in the uninitiated. But it is rapidly becoming clearer to many people, as they take the plunge into the murky waters.

To the serious programmer, a Toolkit is a necessity. Workforce, run by Derek Tidman, has a number of programs which will be of interest. *Programmers Dream* (or PD, author Dr Robert Rayment), is loaded before work starts, and includes several useful features. *Renumber* is a powerful facility which rennumbers your fledgling program from any start point, in any step size, to any finish point. All *Gotos*, *Gosubs*, *Restores*, etc, which will be affected, are taken care of along with the renumbering.

Block Move is a similar facility, allowing the programmer to move a whole chunk of lines to another place within the listing, renumbering being handled along the way. *Erase* will do just that to any number of lines — but beware, *Gotos* and *Gosubs* are not handled by this command (but this shouldn't be a problem — the program would, on Run, go on to the next line after a *Goto* to a non-existent line).

Change String will change either every occurrence of a string, or selected occurrences. *Dump* (strange name) prints on the screen the variable names and values. Finally, but not least, the size of your program, together with the variables can be inspected. All this is pretty standard

fare for Toolkits, and contains nothing new, but Dr Rayment has written a very compact program (just 1450 bytes) which, along with the comprehensive documentation, is an absolute gem. The program is very easy to use — just *Clearspace* above Ramtop, and then begin working on your own program. PD will be ready when needed.

Another compact little beauty from Dr Rayment and Workforce is the *Spectrum Disassembler*, which allows you to peek at the secrets of your machine code programs. The screen display contains, on the left, the address, and in the centre, the code of the bytes at that address. On the right is the mnemonic associated with the code. As you enter your machine code program, the *Disassembler* will translate the bytes into mnemonics for your inspection. The program is well-documented, and assumes the user to be completely familiar with machine-coding techniques.

As an Introduction is very useful

The final Utility from Workforce is *Display* a character generator, written by Gloster Software. Now, there are many CGs on the market, all pretty much the same, though each has its own attractive points — all Spectrum owners will already have a good one on the Horizon tape from Psion, and of course this one is free with the computer. Good value for money!

However, the tape from Gloster/Workforce is a different proposition entirely. As you will know, the Spectrum supports 21 User-Defined Graphics (UDGs) in addition to the 96 standard characters — *Display* will provide you with a massive 273 extra shapes (on the 16K machine) or 336 shapes on the 48K machine. To put it another way, the normal 21 UDGs allowed by the Spectrum may be held in sets of "pages" in memory and called up as needed — 16K will hold 13 pages and 48K will hold 16 pages. *Display* enables you to show all these pages on-screen at the same time.

A demo program is *Loaded* first. This consists of a title page, the text of which is set out in characters of 64 (to the line) width. Around the introductory text is arrayed a large number of UDGs, any of which may be set into animated motion at the touch of a key. You will see, for example, a rocket taking off, rifles shooting at a poor little bird, jugglers, munching Pacmen, dancers, spinning wheels and many more.

The main program follows on the tape. Once this is *Loaded*, a work space is

displayed along with a display "sheet".

Now is the time to *Load* into this space any characters you may have previously created, should you wish to work on them. Following the main program are several "pages" containing the characters from which the demo title page was built — you are advised to *Load* these and use them to gain insight into the workings of *Display*.

The Basic method to amend characters is: *Pick* from the display "sheet" or (if you are creating your own) *Fetch* a standard character from the Spectrum's keyboard, and move the character to the work space. Now the character may be *Turned* clockwise or anti-clockwise by 1/4 or 1/2 turns.

You may also *Invert* (or flip over) the character, *Reverse* back-to-front, *Expand* the character (so that any quarter will fill the whole square), and finally *Shift* the whole thing by one pixel at a time to the left, right, up or down. During this procedure, any of the pixels within the character square may be turned on or off. Finally, your amended or newly-created shape may be returned to the display sheet, ready for eventual *Saving* to tape.

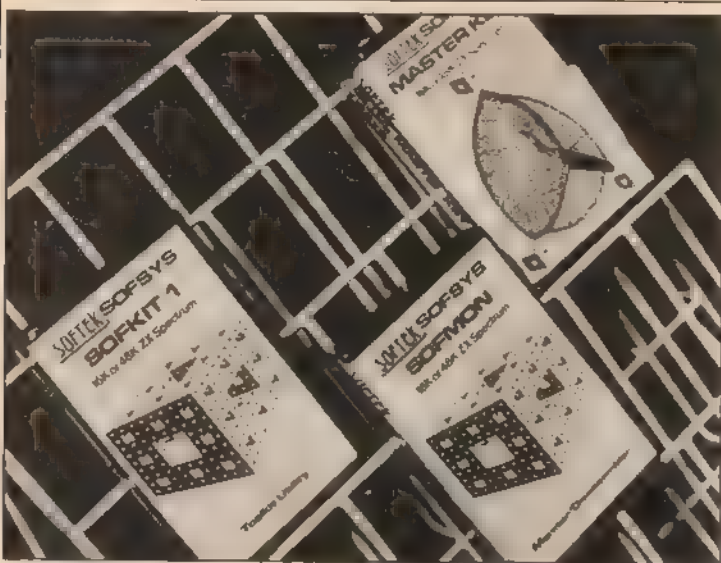
By typing *Help*, a page of options is presented, and this along with the usual good Workforce documentation, ensures that the user is never left helpless. Advice on creating animated graphics is included, and in all, it is hard to imagine a more useful UDG-generating aid than this.

Another machine code programming aid has been published by Oxford Computer Publishing Ltd. Written by O Ainley, the *Machine Code Test Tool* comes nicely packaged in a shiny, sturdy box, slightly smaller in size than a paperback. The accompanying manual is described as a Tutorial in machine code, and fulfills this function quite well. A 32-page booklet cannot enter into quite as much detail as a full-blown book on the subject, but as an introduction is very useful.

Your best course is to work through a book such as William Tang's *Spectrum*

continued over the page





Machine Language for the Absolute Beginner, and return to the program with a better knowledge of the jargon and techniques of machine code programming. Write an exploratory program and use the *Test Tool* to run and debug your attempt. The contents of all the registers will be displayed for you to inspect and change as necessary.

As a bonus, a *Character Generator* (yes, another one!) is included on the reverse side of the cassette — it's fairly standard, with no surprises, but it's nice to get a little gift, isn't it?

Spectrum Machine Language for the Absolute Beginner is just one of many books now on the market (there'll be more), all attempting to instruct the Spectrum user in the delights of machine coding. This book is one of the best I have seen on the subject — for once the title is on the nose! I can recommend this to anyone just getting interested.

The only quibble I have with the book is the amount of spelling mistakes — there is at least one per page, and the *Great Spelling Mistake Hunt* eventually become a major entertainment. Fortunately, this does not detract from the work as a whole, and only becomes a nuisance when a missing page throws the reader into momentary confusion.

A cassette is also available, containing some of the programs from the book.

Whilst on the subject of cassettes that come with books, let me mention once again Trevor Toms' *Spectrum Pocket Book*, which I spoke of briefly some weeks ago. Half of the book consists of the usual games listings, though for a change, these are original and actually quite good. They also, of course, contain a lot of useful routines for the reader's own games. And, incidentally, the line by line documentation of the program is exemplary.

The balance of the book is taken up with a very well-written introduction to machine code techniques.

A cassette is available for the games, and another for the machine code part of the book. Amongst other goodies on the second tape is a *Screen Toolkit*, which is a routine for scrolling up, down, left and right, as well as printing to any pixel.

Another system, recently released, is *Solsys*, from Softek, Tim Langdell's company. The full system consists of five programs — to take full advantage of them, they should be loaded into memory together. However, they may be used individually.

Before work is begun, the heart of the system, *Masterkey*, should be loaded. With the aid of this program, up to seven keys may be defined by the programmer. *Masterkey* comes with five keys pre-defined, which may be edited to suit the user's requirements. As they stand, they control, with one key-touch, entry of the Assembler which is another part of the system, entry of the Disassembler, and the operation of the Compiler.

Softek, confusingly, has another name for this program, *Softime*, which hints at its other facility, a clock.

With *Masterkey* in memory, *Softkit 1*, a programming toolkit maybe loaded. This is a fairly straightforward toolkit — like many others, it enables the use to *Renum*ber (with all *Gotos*, *Gosubs* and so on), *Erase* a *Rem* statements (thus saving memory), and examine the length of program and variables at any time. The program will also change upper case characters into lower, and vice-versa.

Probably the most important and unusual feature for a program at this price and this computer, is the *Trace* facility. Run the program through, and you'll see the line number and statement currently being processed. Thus, if the program

hangs up, the bug can be traced very easily.

Softkit 1, like some of the other parts of *Solsys*, has been written by Andrew Glaister, the author of several best-selling games for the Spectrum.

The next element of *Solsys* is *Solmon* (look, I didn't dream up these names!), the Disassembler/Monitor of the system. There are two versions, one for each of the memory sizes, but the facilities are the same in either case. Each command maybe accessed by one keystroke, thus, at one stroke relieving you of the need to buy *Masterkey*.

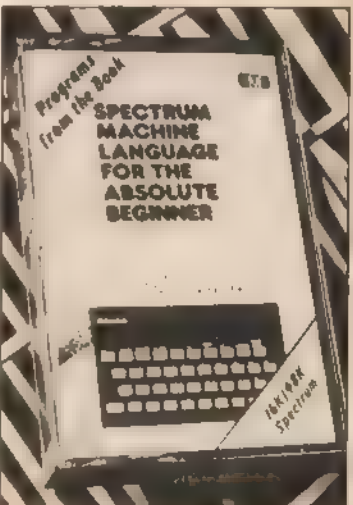
As will be the other parts of *Solsys*, the documentation is precise and clear, guiding the user effortlessly through the highways and byways of the Utility. Twenty-five functions in all are available, including, in the Monitor section, *Erasing* or *Inserting* bytes in memory, decimal to Hex conversion, and vice-versa, *Moving* areas of memory, finding a series of bytes, and so on.

Probably the most intriguing part of the whole *Solsys* package, however, and one that Softek obviously regard as the flagship of the system, is the Compiler, or *Super C*, as Softek couldn't refrain from calling it!

A number of things the Super C can't handle

Super C comes well-packaged in a large box that opens like a book to reveal the cassette nestling inside along with a 22-page instruction manual. The cover artwork shows, for some strange reason, a futuristic starship pilot fixing the viewer with an icy stare. Reflected in his visor is a — well, probably a Betelgeusian Battlecruiser! And just when you thought it was safe to go back to the Spectrum! Eye-catching, however, which is the object of the exercise.

The Compiler converts, more or less



instantly, your Basic program into machine code, thus endowing the program with all the benefits of machine code. Three small programs are included in the package, which demonstrate the point admirably. A screen printing routine is followed by a count from 1,000, and in both cases, the compiled program is orders of magnitude faster.

The most impressive demonstration is the third, a very simple *Invaders* program. In Basic it is very slow, and you wouldn't want to play it for more than a few seconds. When compiled, the program becomes very much faster, and the game is at least bearable for a couple of minutes.

Down to the operation now — and it's all clearly explained in the manual. If *Masterkey* has been *Loaded*, a key can be defined to handle the compiling command, but that's very quick to type anyway. Just *Load* your Basic program, and then simply key *Randomise* *Usr* 49152 — a fraction of a second later, the program is in machine code!

Sounds simple, doesn't it? Well, it is, but don't get the idea that you can write anything in Basic and have it compiled for you. There are a number of things that *Super C* will not handle, and which necessitate extra thought when writing your original program.

First, variables can only be upper case (capital) characters, and you are only allowed to define 25 of them — A-Z. A second example is *Gotos*, *Gosubs* and *Returns*. These must all refer to an existing line, no more jumping to a vague line number and letting the computer find the next relevant line. *Super C* will not, moreover, recognise a calculated line number (so you cannot say *Goto* 20*score).

A stand that is morally indefensible

A final example here, although there are several more in the manual, is the restriction on local colour commands. You'll be used, in Sinclair Basic, to putting *Over*, *Inverse*, *Ink*, *Paper*, and so on within *Print* statements — these will not affect the rest of the screen or program. These will not be compiled by *Super C*. You will have to set the parameters globally, and then reset after the *Print* statement.

However, the most serious drawback in *Super C*'s facilities is that it will not compile statements involving fixed-point arithmetic, and will not allow string-handling statements. An enhancement package will, says Softek, be available soon to enable the programmer to use these facilities in his Basic program.

I don't know if Softek intends to give the package to existing customers or will charge extra for them, but I think a program calling itself a Compiler should certainly include these facilities.

The total Sofsys package can be recommended, and the Compiler, in particu-

lar, though expensive at £15, — with the caveat of the lack of some important facilities — worth every penny.

One final doubt nags me, however, and that is about the copyright notice in the beginning of *Super C*'s manual. I've deliberately left this point out of my appraisal until now — it will only affect you if you intend to market your compiled program. Softek is very concerned that, as such programs must contain some of *Super C*'s routines, the company must ask

you for a royalty. I think this stand is, morally at least, indefensible. There are many compilers in use much higher up the computing scale, at the minicomputer and mainframe level. Royalties are not sought by the original manufacturers of these programs, unless the actual compiler itself is passed on to a third party as part of a total package.

Legally, of course, Softek are entitled to ask whatever they desire — and Sofsys remains as a most important suite of programs for the programmer. ■



Firm	Program	Cost
Workforce 140 Wisden Avenue Luton Beds	Programmers Dream Display Spectrum Disassembler	£8.95 £7.00
Oxford Computer Publishing Ltd PO Box 99 Oxford	Machine Code Test Tool	£9.95
Melbourne House Glebe Cottage Station Road Cheddington Leighton Buzzard Beds	Spectrum Machine Language for the Absolute Beginner	£6.95
Phipps Associates 99 East Street Epsom Surrey KT17 1EA	Spectrum Pocket	6.50
Softek 329 Croxted Road London	Masterkey Softkit 1 Softman Super C	£7.99 £7.99 £7.99 £14.95

STARTTECH



VIC 20 16K RAM PACK £28.95

Including VAT and Postage and Packing.

Tick for further information

- ☐ VIC 20 PRODUCTS
☐ COMMODORE 64

All prices Subject to
availability or change without notice

PLEASE SEND ME

VIC 20 16K RAM PACK

Qty

Price

£28.95

TOTAL

(24hr. ANSWERPHONE SERVICE)

Name

Address

I enclose Cheque, M/N for

CREDIT CARD ☐ ACCESS ☐ BARCLAY CARD ☐

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

POPC-W.6.83

STARTTECH

208 Aigburth Rd, Aigburth, Liverpool L17 0SL 727-7267

Clearly labelled!

R Luxton explains how to make your own labels on the 16K ZX81

Label Maker is a routine for the 16K ZX81 to print your own personal label at the head of any program. It can take the form of a "copyright" mark, a special

instructions panel, a fancy nameplate, or whatever you want. It is designed to be Poked above Ramtop, so that it can be quickly added to any existing program.

Fig 1 Label Maker

```

1 REM .....
.....
20 FAST
30 REM .....
40 REM INPUT TITLES
50 REM .....
60 PRINT "ENTER PROGRAM TITLE"
70 INPUT A$
80 IF LEN A$ > 25 THEN GOTO 70
90 PRINT
100 PRINT "ENTER COPYRIGHT LINE"
110 INPUT B$
120 IF LEN B$ > 25 THEN GOTO 110
130 REM .....
140 REM SET-UP GRAPHICS
150 REM .....
160 LET A=137
170 FOR I=16513 TO 16635
180 IF I=16540 THEN LET A=136
190 IF I=16564 THEN LET A=138
200 POKE I,A
210 NEXT I
220 LET A=133
230 FOR I=16513 TO 16609 STEP 3
240 POKE I,A
250 NEXT I
260 LET A=6
270 FOR I=16539 TO 16635 STEP 3
280 POKE I,A
290 NEXT I
300 LET A=0
310 FOR I=16540 TO 16609
320 IF I=16545 THEN LET I=16572
330 IF I=16577 THEN LET I=16604
340 POKE I,A
350 NEXT I
360 REM .....
370 REM POKE IN TITLES
380 REM .....
390 LET C=1
400 LET Z=INT ((26-LEN A$)/2)
410 FOR I=16546+Z TO 16546+Z+LE
N A$
420 POKE I,CODE A$(C)
430 LET C=C+1
440 IF C>LEN A$ THEN GOTO 460
450 NEXT I
460 LET C=1
470 LET Z=INT ((26-LEN B$)/2)
480 FOR I=16578+Z TO 16578+Z+LE
N B$
490 POKE I,CODE B$(C)
500 LET C=C+1
510 IF C>LEN B$ THEN GOTO 530
520 NEXT I
530 CLS
540 GOTO 560
550 STOP
560 PRINT "IF LINE 1 IS OK," "E
NTER GOTO 600 AND NEWLINE." "IF
NOT," "ENTER GOTO 20 AND TRY AG
AIN."
570 PRINT
580 PRINT
590 PRINT
590 LIST
600 LET A=16513
610 FOR I=32645 TO 32767
620 POKE I,PEEK A
630 LET A=A+1
640 NEXT I
1000 REM .....
1010 REM REMOVE WHOLE PROGRAM
1020 REM .....
1030 NEW
2000 SAVE "LABEL MAKER"
2010 RUN
    
```

ram's title, and then the copyright line, after which the screen will go blank for a few seconds, and will then List showing your label in 1 Rem. If the label is correct, just enter Goto 600 and Newline. If not, then enter Goto 20 and Newline, and enter it again. When the label is right, enter Goto 600 and Newline, and the computer will Poke your label above Ramtop.

Now Load the program on which the label is to appear and add a 1 Rem with exactly 122 full stops, and the lines in Fig 2, preferably at the end of the program. Then enter Goto 9000 and the label will be down-loaded from above Ramtop to the head of your program. Also, enter as a direct command "Poke 16510.0" to change the line from 1 to 0, where it is safe from accidental erasure.

The program will not Run in the usual way, although Run will still clear the variables. You should start your program by "Goto (the second line)" or "Run (second line)", if the variables need resetting.

As an extra, add lines 8999 and 9025 (Fig 3) and then enter as a direct command "Print A\$" after you have down-loaded your label. It will then be in A\$ as well as at the head of your program. This is very useful for calling from anywhere throughout the program as a natural break or just as a piece of advertising. Or, just enter "Lprint A\$" for the printer to produce a convenient sized label for sticking to cassettes or cassette cases.

Fig 2

```

1 REM .....
.....
9000 LET A=32645
9010 FOR I=16513 TO 16635
9020 POKE I,PEEK A
9030 LET A=A+1
9040 NEXT I
    
```

Fig 3

```

8999 DIM A$(123)
9025 LET A$(I-16512)=CHR$
PEEK A
    
```

Examples of labels

```

ZX81 LABEL MAKER
(C) 1983 R.G.LUXTON

DO NOT ENTER *RUN*
TO START ENTER *GOTO 10*
    
```

The Pit — part two

Paul Sellin presents part 2 of The Pit — a text adventure for the 16K Spectrum

This week, having initialised the arrays and variables ■ start the game, we shall look at one of the most important elements in an adventure game — the monster.

Lines 3015 to 3075 contain the monster routine, with the data being stored in line 3100. The routine is really very simple: once the monster has been 'chosen' from the data, either it attacks you (line 3025), you attack it (lines 3030 to 3035) or you retreat.

If you are still 'alive' after the monster has attacked you, then the program moves on to the 'attacking the monster' sequence. If the monster survives, which is checked at the end of line 3035, then the

program jumps back to line 3025 and puts you under attack again!

On entering the monster routine, the computer must randomly select which monster to present. This occurs in line 3015 — by looping a random number of times, each time reading a set of data, the current data after the last loop becomes the chosen monster.

Line 3100 contains five pieces of data for each monster: first its name, which is a string and is assigned ■ *ps*, then four variables representing in turn its strength, *psi* power, dexterity and intelligence, each in the range 0 to 20. These are assigned to the four variables *st*, *ps*, *de* and *in*. Notice how the monster's variables differ from the

player's variables of *s*, *p*, *d* and *i*.

If you survive the monster's attack, then you have the chance to fight back. Depending on your dexterity, the computer allows you a certain amount of time in which to attack — if the time runs out, then the monster attacks again.

The computer allows you to attack in one of three ways: either by casting a spell (key *s*), by giving it a thought problem (key *t*), or by just attacking normally (any other key except *r*). Pressing the *r* key allows you to retreat.

The spell routine is in lines 3050 and 3055. It prints up ■ suitably fiendish spell and then calculates its effects by comparing the variables *p* and *ps*. If the monster dies, then the whole monster routine is exited via line 3040; if not, then the monster attacks again with the program jumping to line 3025.

The 'thought' routine works in ■ similar way in lines 3060 to 3070. The computer

```

2530 DATA "a potion of sight", "a
hoking gas!!!", "Flash!!", "an expl
osion!", "an old skeleton", "a set
of bonuses!", "nothing", "a set o
f bonuses!", "nothing"
2540 IF x$(1 TO 2)="Fl" THEN LET
si=0: GO TO 8500
2545 IF x$(1 TO 2)="ch" THEN PRIN
T "It weakens you...": LET d=INT
(d-RND*8): LET i=INT (i-RND*8):
LET s=INT (s-RND*5): GO TO 8000
2550 IF x$(1 TO 3)="a p" THEN PRI
NT "You boost your powers of si
ght...": LET si=1: GO TO 1000
2560 GO TO 1000
2705 IF NOT si OR NOT fl THEN GO
TO 8500
2710 IF y(2 OR x(2 OR y)9 OR x:1
9 THEN PRINT "No Flares here,
dear creature...": BEEP .2,-12
: GO TO 1000
2715: CLS: PRINT "Here goes wi
th one precious flare...":
FOR f=y-1 TO y+1: PRINT TAB 12,
PAPER 2, " ": FOR e=x-1 TO x+1:
PRINT INK 7; PAPER 2, a$(z,f,e):
NEXT e: PRINT " ": NEXT f: P
RINT AT 5,15; "+": INK 0: LET fl=
fl-1: PRINT " ": GO TO 1000
2720 GO TO 1000
2800 PRINT "Oh dear... You've f
ound a Time Warp...": LET z=1+IN
T (RND*3): LET x=1+INT (RND*19):
LET y=1+INT (RND*9): FOR h=36 T
O -12 STEP -1: BEEP .05,h: NEXT
h: PRINT "You are now at Level
":z: "At position "x";",y": GO
TO 8000
2900 LET e=1+INT (RND*9): LET fl
=fl+e: PRINT "You found "e"; fl
ares...": LET a$(z,y,x)=" ": GO TO
8000
3015 RESTORE 3100: FOR f=1 TO IN
T (1.5+RND*7): READ ps,st,ps,de,
in: NEXT f: PRINT "You have foun
d "ps"; "Status Report: "Stren
gth",st" "Psi Power",ps" "Dexterit
y",de" "Intelligence",in: FOR f=
1 TO 300: NEXT f: IF d-de:0 THEN
IF 5+RND*d>de*2 THEN GO TO 3030

```


generates a random multiplication sum in line 3085 — the accuracy of the monster's 'answer' is dependent on *in*, its intelligence, plus a random factor.

There are a few little extras, such as you not being allowed to 'think' if *i* is less than 10, whereupon you will immediately be attacked again. Also, a stupid monster, where *in* equals zero, will ignore your sums and proceed to attack regardless.

'Retreating' is contained in line 3033 which just prints up a suitable message and exits the monster routine to line 8000. But, your strength is reduced significantly if you retreat from a weak monster.

Normal attacking revolves around line 3035 which calculates the monster's damage and subtracts it from its strength. If *st* is still greater than zero, then the monster attacks you again with the program jumping back to line 3025.

On killing the monster and reaching line 3040, your psi power is increased according to that of the monster. The *m* character

in the main array is replaced by a space, ensuring that the monster really is dead. If you kill the *Warlord*, which is the strongest monster of them all, then you could pick up treasure if the program jumps to the 'treasure' routine in line 2000.

On leaving the monster routine in line 3045, the program jumps to line 8000. This is just one big multi-statement line, which prints out all the variables and strings of the player. *Poking* 23692 just lets the screen scroll automatically. This routine then jumps back to the main loop at line 1000.

A couple of other useful blocks of program are those which give the player his 'eyes'. These are the 'flare' routine (lines 2700 to 2715) and the 'map' routine (lines 9201 and 9220). Both are accessed directly during the game by pressing keys *f* or *m* respectively (lines 1003 and 1004). If you are blind and *si* equals zero, then both routines will jump to line 8500 and then back to the main loop.

The 'flare' routine prints out the eight positions all round your current position and draws a box around them, at the same time taking one off the *fl* variable, and then returns to the main loop at line 1000. But, note that the flares will not work on the edges of the array (line 2710 — why do you think that is necessary?).

Finally, the map routine in line 9220 prints out horizontally the 10 rows of that 'page' of the array and marks your current position. Note the double *Pause* statements before jumping to the Status Report; this is to get round the Spectrum Rom bug which sometimes ignores a single *Pause* statement.

Next week we shall look at the final part of *The Pit*.

● *The Pit* has been split into three parts. Enter part 2 of the program now and Save it on tape. Part 3 will be published next week. You will need to enter all three parts of the program before Running it.

```

3025 BEEP .1,0: PRINT "The mons
ter attacks...": PAUSE 100: LET
h=ABS (INT ((st*AND)-ar*AND/2)/
2)): PRINT "You take "h" damag
e...": LET s=s-h: PRINT "Your stre
ngth: "s: PAUSE 30: IF s<=0 THEN
GO TO 9800
3030 BEEP .1,24: PRINT FLASH 1:
"***Strike Now***": PAUSE 1: PAU
SE 4*5: IF INKEY$="" THEN PRINT
"Too late...": GO TO 3025
3031 IF INKEY$="s" THEN GO TO 30
50
3032 IF INKEY$="t" THEN GO TO 30
60
3033 IF INKEY$="r" THEN PRINT "
Cowardly Creature!": LET s=s-IN
T ((21-st)/4): GO TO 8000
3035 PRINT "You attack...": PAU
SE 50: LET h=ABS (INT ((s*AND*2
)-de*AND)/2)): PRINT "Monster ta
kes "h" damage...": LET st=st-h:
PRINT "Its strength: "st: IF st
>0 THEN GO TO 3025
3040 PRINT "You have killed the
monster...": LET p=p+INT (ps/4): L
ET a$(12,y,x)="": IF p$="the War
lord" THEN IF AND*10>6 THEN PRINT
"you're lucky, the monster was
carrying treasure...": GO TO
2010
3045 GO TO 8000
3050 PRINT "INVERSE 1: Rest th
y time, thou ferocious and accurs
d creature": FOR e=1 TO 60: NEXT
e: PRINT "The monster staggers.
...": PAUSE 1: PAUSE 100: IF AND*
p*5>ps*2 THEN PRINT "...and dies
...": GO TO 3040
3055 PRINT "...and recovers...": L
ET p=p-ps/4: GO TO 3025

```

A feast for everyone interested in computers.

We're preparing a mouth-watering spread for our 4th International Computer Show at the Cunard Hotel, Hammersmith.

Over 120 exhibitors from all over the world will be there.

Which makes this Show the biggest ever mounted in Britain by one computer manufacturer.

£3,000 WORTH OF EQUIPMENT TO BE WON

There's also £1000 worth of computer systems to be won every day at the Show.

COVER CHARGE

Admission to the Show costs only £1. Family tickets are also available for just £2.50.

And isn't that a small price to pay for a feast like this?

 **commodore**



I cannot attend but would like information on Commodore Computers (please tick box):

Personal ☐ Business ☐

Name _____

Address _____

Postcode _____

Post to: The Commodore Information Centre,
Dept. CS, 675 Ajax Avenue, Slough, Berkshire SL1 4BG.
Telephone Slough (0753) 79292.

Telephone _____

CSICY 2605

THE CUNARD HOTEL
HAMMERSMITH LONDON W6 8DR

HARDWARE

An appetising array of new products, portable and hand-held computers, colour and daisy wheel printers, and full colour monitors. Plus the VIC 20, Commodore 64, 8000, 500 and 700 series.

SOFTWARE

A carefully chosen selection of games, CAD/CAM, information retrieval, spread sheets, word processors and educational software.

PERIPHERALS

As accompaniments to your main system, choose from the vast range of disk drives, printers, plotters, monitors and games accessories.



THE COMMODORE 4TH INTERNATIONAL COMPUTER SHOW

THURSDAY JUNE 9TH - 2 PM - 6 PM
FRIDAY JUNE 10TH - 10 AM - 6 PM
SATURDAY JUNE 11TH - 10 AM - 5 PM

DRAGON 32 NEW FROM **TROJAN** "SPACE TREK"

Space Trek is an absorbing space wars game in real time which can be played in any of four levels. Special features include: Onboard battle computer, long-range galaxy scanning, a galaxy containing 100 quadrants, impulse and warp drive speeds, shield control and status reports.

THE TROJAN LIGHT PEN

PLUGS INTO JOYSTICK PORT
SUPPLIED WITH CASSETTE OF INSTRUCTIONS
A SIMPLE-TO-USE DEVICE FOR MICRO FANS

REVERSI

THE CLASSICAL GAME WRITTEN IN HIGH RES WITH
COLOUR AND SOUND. 4 LEVELS OF PLAY, SUITABLE FOR
ALL AGES

Send to: **TROJAN PRODUCTS, Dept PCK**
166 DERLWYN, DUNVANT
SWANSEA, WEST GLAM SA2 7PF

Please send:
SPACE TREK ☐ I enclose cheque/PO for £7.50
LIGHT PEN ☐ I enclose cheque/PO for £10.00
REVERSI ☐ I enclose cheque PO for £5.50

All prices include post and packing

MR/MRS.....

ADDRESS.....

Micron

FOR MICROCOMPUTERS

Serving Sheffield and North Derbyshire, we stock an expanding range of software from BUG-BYTE, QUICKSILVA, SALAMANDER, SILVERSOFT, ARTIC, NEW GENERATION, WORKFORCE, DK'TRONICS, MELBOURNE HOUSE, PSION, DRAGON DATA and many more.

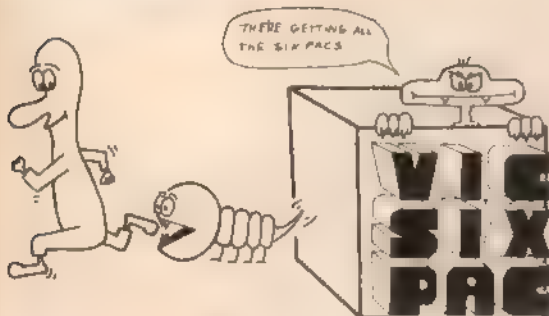
ALSO BOOKS, KEYBOARDS, GRAPHIC ROMs, LIGHT PENS, RAM PACKS, PRINTERS and other hardware for ZX81, Spectrum, VIC and Dragon.

Our range of machines at present includes: ZX81, SPECTRUM 16/48K, DRAGON 32, ORIC 48K, VIC20, CBM 64 ALL AT COMPETITIVE PRICES.

Why not pay us a visit or phone for our prompt mail order service

MICRON AUDIO LTD
172 BASLOW ROAD, TOTLEY
SHEFFIELD, SOUTH YORKS S17 4DR
Telephone (0742) 360295
CLOSED ALL DAY MONDAY

VIC-20 **GAMES**



NOW FOR THE FIRST TIME IN UK.....

Six famous arcade quality games use machine code. Hi-res multi-color gfx, exciting sound effects, for any VIC-20, keyboard or joystick.

Available now in UK direct from manufacturer only thru our super fast mail order service, or 24hr credit card sales line. All games supplied on cassette with written money back guarantee.

Galactic Software

LAMBROOK RD. SHEPTON BEAUCHAMP, SOMERSET TA19 0LZ



£9.95

FOR
SIX
GAMES

FROGGER
3D MAZE
NEW YORK BLITZ
ROBOT MOUSE
SPACE SHUTTLE
BUG DIVER

MONEY BACK GUARANTEE

Please rush my VIC SIX PAC

Debit my Access/Visa card (delete as necessary)

Card

Number

I enclose cheque/PO for **£9.95**

Name

Address



0460 40744 (24hrs)



All keyed up!

Peter Chase explains how to use machine code to enhance the Dragon's keyboard

This article is aimed both at readers who have assembler packages and may be wondering what to do next, and for those who would like to extend the capabilities of the Dragon by using machine code routines in their Basic programs. The following routines are designed to improve keyboard responses and to extend colour and text usage.

The **Inkey\$** function will only tell that one key is being pressed. If more than one key is pressed then neither key will register. Similarly, if one key is already being held down, a second one will not register.

Using machine code, it is possible to check if any key is being held down, regardless of how many other keys are being pressed. This has very many applications. For instance, it allows diagonal movements by pressing two arrow keys or, in action games, one key can be used as an 'accelerator' and another for 'steering', etc.

To find out if a key is being pressed, it is necessary to place its column number into location **&HFF02** and then to check the appropriate bits in location **&HFF00**. Listing 1 **@KEY** shows how this can be programmed in assembly language.

The program works by storing the A register in the column select register at **&HFF02** and then comparing the B register with the contents of the row input register **&HFF00**. Table 1 shows what values to put in the A and B registers to check any key. If the selected key is depressed, then the Z flag in CCR will be set, allowing the use of **BNE** and **BEQ** jumps.

For those without assemblers, lines 15-60 of Listing 2 show how the routine can be entered into Basic programs by Poking the hex codes into locations starting with **&H7001** (the additional codes allow the row and column numbers to be Poked into locations **&H7002** and **&H7003**). The routine is then accessed with **Exec &H7001**.

Listing 2 itself is a program showing one use of the **@KEY** routine. It allows hi-res drawing in eight directions with the four arrow keys. Pressing the arrow keys alone gives movement, while depression of shift and arrow keys together allows drawing on the screen. You can produce very intricate 3-dimensional drawing with this program which can then be Saved as screens on cassette.

One of the major drawbacks of the Dragon 32 is that it is not possible to have text and hi-res graphics together using Basic alone. Also, the number of colours in hi-res modes is very limited. However, the video chip used in the Dragon is capable of producing many more modes. One of the

most useful of these is alpha semigraphics mode 24, which allows usual text, 64 x 192 hi-res graphics and nine colours all to be used at once. In a previous issue of *Popular Computing Weekly* it was explained how to get into mode 24 from Basic using **Poke &HFFC5,0:Poke &HFFC3,0:Poke &HFFC0,0**.

For those with assemblers, Listing 3 contains five routines for printing text in mode 24. **@SEL24** selects mode 24, while **@CLS24** fills the mode 24 screen with the character stored in location **&HFF0**. **@PT2** prints the character stored in the location **&HFF2** at co-ordinates stored in **&HFF0** and **&HFF1**.

@SCRL24 scrolls the screen up one line. **@MSG24** prints a message to the screen from the address pointed to by the Y register. To use the latter routine, both **@PT2** and **@SCRL24** must be in memory as well.

If you want to use these routines from Basic, then the first four can be entered as shown in lines 15-60 of Listing 2 by Poking the hex codes (column two of Listing 3) into addresses starting **&H7FF0** and then **Exec** the address of the routine. To use **@MSG24** from Basic, it is first necessary to define **Def Usr0 = &H7080** at the start of your program and then use **N = Usr0(Varptr(AS))** where **AS** is the

string you wish to print.

The real advantage of mode 24 is the mixing of text with 9-colour hi-res graphics. The display memory in mode 24 goes from 1024 to 7168 (decimal). Each of the 192 rows contains 32 bytes and each byte is organised as in Figure 1.

Fig 1

Set Colours		Bit			
Br	(0-7)	L1	L2	L1	L2
1 - graphics	0 - 10-1				
					1 - colour
					0 - black
Colour		6	5	4	Bit
Green	0	0	0	0	
Yellow	1	0	0	1	
Blue	2	0	1	0	
Red	3	0	1	1	
Bull	4	1	0	0	
Cyan	5	1	0	1	
Magenta	6	1	1	0	
Orange	7	1	1	1	

For example, to set the top left pixel yellow, then the binary for the appropriate byte is **10011010** which equals 154 in decimal. So in Basic, the command would be **Poke 1024,154**. The equivalent assembly instruction is **LDA #154 Sta 1024**.

Listing 4 is an assembly program to show the mode 24 9-colour hi-res graphics. Listing 5 is a version of this for use without an assembler and shows the mixing of text with hi-res graphics.

Table 1

	FE	FD	FB	F7	EF	DF	BF
FE	0	8	@	H	P	X	ENT
FD	1	9	A	I	Q	Y	CLR
FB	2	:	B	J	R	Z	BRK
F7	3	;	C	K	S	UP	
EF	4	,	D	L	T	DN	
DF	5	-	E	M	U	RT	
BF	6	.	F	N	U	LT	
DF	7	/	G	O	W	SPC	SFT

Put the number across the top into A or if using BASIC poke it into **&H7002**. Put the number down the side into B or POKE into **&H7003**.

continued on page 25

ZX MICROFAIR
7th ZX Microfair
Alexandra Palace
4 June, 1983



**FOX
ELECTRONICS**

Presents Products:

**NEW!
LOWER
PRICE**

ZX MICROFAIR
7th ZX Microfair
Alexandra Palace
4 June, 1983

For the Spectrum, The VIC-20, The Jupiter Ace and the ZX-81

SPECTRUM UPGRADE ONLY £23.99

SEND NOW TO UPGRADE YOUR SPECTRUM
FROM 16K TO 48K. SIMPLE INSERTION
NO SOLDERING REQUIRED
FULL INSTRUCTIONS SUPPLIED
(ISSUE TWO MACHINES ONLY)

Also available for both the
SPECTRUM or ZX81

The FD42 Keyboard. A keyboard to house your Spectrum/ZX81 PCB and give you a full typewriter type keyboard, no soldering or electronic knowledge required to fit. Only

£29.95
INCLUSIVE



VIC20

More memory for your VIC20

Vixen RAM Cartridge for the VIC20

Switchable between 16K or 8K + 3K.
Gives you the option of full 16K RAM or 8K and 3K RAM in one package. When added to a Standard VIC20 gives 16384 bytes of extra memory in memory blocks 1 and 2 or 3092 bytes of extra memory into the 3K memory block AND 8192 bytes of extra memory switchable between memory blocks 1 and 3.

Fully compatible with available motherboards/modules. Simply plugs into the rear expansion port of computer. ■ re-addressing of existing BASIC programs needed.



Only
£39.95

Tandem

Expandable Expansion System for the VIC20

Gives 4 expansion slots for VIC20 cartridges. Custom-designed case. Plugs directly into computer. Further expanded by using TANDEM System! ROM socket for expansion. ■ extra power supply needed.

Only £30.00



SEND NOW TO

FOX ELECTRONICS

141 ABBEY ROAD
BASINGSTOKE, HANTS. TEL: 0256 20671

CALLERS WELCOME

ZX81

THE BEST
AVAILABLE EXPANDABLE
RAM PACK
AT THESE NEW LOW
PRICES

16K
£19.50
(+ 45p P&P)



32K
£34.00
(+ 45p P&P)

The **ZX-PANDOA**. A 16K RAM pack expandable at any time to 32K by simple plug-in insertion or ■ £14.50 module.

The **ZX-PANDA**, a specially converted unit, designed to eliminate wobble and memory loss. Housed in ■ very attractive case and now at very attractive prices!

AND FOR THE ZX81

Another replacement keyboard, this one with a calculator type feel. Peel off backing and press to fit at only
£10.00

JUPITER ACE Pacer

The Uniquely expandable
16K RAM pack

Similar concept to ZX-PANDA but for the incredible Jupiter Ace. Attractive, solidly built 16K RAM pack with the facility of expanding to 32K by plug-in module. For more power to faster FORTH ... you need a PACER!

16K Expandable RAM **£29.95**
16K Expansion Module **£14.50**

New



SEND SAE FOR FULL CATALOGUE

ALL OUR PRODUCTS ARE IN STOCK
AND USUALLY DESPATCHED WITHIN 10-14 DAYS

ITEM	TOTAL
SPECTRUM UPGRADE at £23.99 inc	
SPECTRUM KEYBOARD at £29.95 inc	
VIXEN RAM CARTRIDGE at £39.95 inc	
TANDEM EXPANSION at £30.00 inc	
ZX-PANDA 16K at £19.95 inc	
ZX-PANDA 32K at £34.45 inc	
ZX-PANDA EXP (MOD) at £14.50 inc	
JUPITER ACE PACER 16K at £29.95 inc	
JUPITER ACE PACER 16K MODULE at £14.50 inc	

Please send me the above item/s. I enclose my remittance for £.....

Sell your unwanted Software!

**80% of original price paid!
Any home micro!**

**Special opportunity to get into
games programming will be
enclosed with details sent!**

**Spectrum 16/48K - ZX81 - VIC 20 - Commodore 64
Dragon 32 - BBC A/B - Oric - Acorn Atom - Lynx
and Newbrain.**

Send for full details to:

COMPUTERHOUSE

FREEPOST

ILFORD

ESSEX IG1 2BR

Name _____

Address _____

PCWk

Cause and effect . . .

Calvin Woodings explains how to use the analysis of variance technique

In any set of experimental results, the variations which appear will have arisen from a number of different sources. At the very least, there will be the variation caused by the effects of the factor being investigated, along with the variation caused by the errors in measuring these effects.

More complex experiments can involve several factors being tried at several levels — unwanted variations can arise from the method of measurement, the operator carrying out the tests, the day on which the test was done, and even such apparently unlikely effects as the weather. Analysis of Variance (*Anova*) is an extremely powerful statistical tool which enables you to quantify such variations, so that you can decide which of the deliberately created effects are important compared with the unwanted error or interaction effects.

Unfortunately, many different types of *Anova* are required to cope with the many different types of experiment, and a general purpose program to suit all options is way beyond the scope of this article. So, in order to give the reader a taste of the possibilities, this program deals with experiments involving between two and six factors, each at two levels, and with all possible interactions of the factors being studied. Such experiments are known as 2^n Factorials, where n is the number of factors and 2 is the number of levels of each factor (this notation also tells you how many trials are involved overall; eg, three factors at two levels means 2^3 or 8 separate trials). Such an experiment is frequently used at the outset of an investigation, when you are interested in looking at several different effects to decide which ones merit a more detailed study.

Suppose you are interested in improving the fuel consumption of your car. Suppose also you feel that the grade of fuel, the tyre pressures, and the maximum speed used are going to be important. You decide to measure the consumption over a standard route with two star versus four star fuel, 20 psi versus 30 psi in the tyres, and 50 versus 70 mph as speed limits. The complete factorial experiment will involve 8 runs as shown in Figure 1.

Each run involves a different combination of factors and the table illustrates these runs arranged in the 'standard order' to suit our method of analysis (devised originally by F Yates in 1937). Notice how the levels of the factors alternate going down the columns. The order is Lo/Hi for factor 1, Lo/Lo/Hi/Hi for factor 2, and Lo/Lo/Lo/Hi/Hi/Hi for factor 3.

While it is important to arrange the results in this way prior to analysis, in this sort of trial it is also important not to carry out the runs in the same order. In fact, the run order should be randomised so that any unwanted effects (eg, the weather) are not easily confused with the factors being investigated.

Let's assume you carry out the trial and obtain the results shown in the last column of Figure 1. You run the program typing in 3 for the number of factors, fuel, tyres, and speed for the factor names, and MPG for the results name — then you type in the results in the order requested. You then have an opportunity to edit the data.

The next prompt, asking for an estimate of the error variance from other similar trials needs some explanation. In *Anova*, the significance of effects and their interactions is estimated by dividing the variance (or mean square) due to the effect under

review by the variance due to experimental error. This error variance may be available from the analysis of other trials. Such 'external' estimates of error are to be preferred if available, but if not the full factorial experiment enables you to get an error estimate by treating the more unlikely interactions as errors.

The ratio of effect to error variance is known as the variance ratio or F-ratio. Statistics text books generally contain tables of F-ratio which enable the calculation of the significance of the effects being studied.

In this case, we have no external error estimate so answer No to the prompt. The first *Main Effects* table appears (Fig 2) and informs you that increasing Fuel (ie, changing from 2 star to 4 star) adds 1.13 miles to your gallon, while increasing Tyres (ie tyre pressure) adds 3.63 mpg. Increasing speed reduces mpg by 2.92. The error mean square shows 0 because you did not have one from other trials — you are advised to be prepared to note the numbers of those interactions which you are willing to sacrifice in the interests of significance testing.

Continuing to the next screenful, the 1st order interactions (ie, the interactions of all possible pairs of main effects) appear (Fig 2). In this example they are all relatively unimportant as indicated by the small *Mean sq* figure. Similarly, the second order interaction (only one possible interaction of groups of three effects in this case) is unlikely to be of any great experimental interest. Note that the numbers of the interactions are the numbers of the 'standard order' used for data entry, and not the order in which they appear on the screen.

Now that you have decided that none of the interactions are of any value, you can pool their variances to estimate the error variance. Enter 3, 5, 6 and 7 followed by 0 to end and say Y to look at the tables again. This time the F-ratios for each effect are given, along with the value of F-ratio corresponding to the 90 percent confidence level (Fig 3). You can now see that

STANDARD ORDER	FUEL level	GRADE value	TYRE level	PRESS value	SPEED level	value	RESULTS
1	lo	2	lo	20	lo	50	28.9
2	hi	4	lo	20	lo	50	30.0
3	lo	2	hi	30	lo	50	32.6
4	hi	4	hi	30	lo	50	33.3
5	lo	2	lo	20	hi	70	26.1
6	hi	4	lo	20	hi	70	26.7
7	lo	2	hi	30	hi	70	29.1
8	hi	4	hi	30	hi	70	31.2

Figure 1. Standard order for results in 2^3 Factorial

the tyre pressure effect is not only the biggest factor in improving fuel consumption, but also the effect of highest significance. Speed is the next most important effect, and is highly significant in reducing the miles per gallon figure. Fuel is less important.

Program notes

Procdataload and Procentry control data

input, the standard order being computed by lines 610 to 650. Procanalysis calculates the effects of the changes and the corresponding mean squares using Yates' method. Note that for 2 level factorials the effect and mean square are exactly equivalent and that the mean square is also the sum of squares (mean squares = sum of squares/dof, and dof or degrees of freedom are 1 in a 2 level experiment). The

arrays required for the standard order labels and Yates' analysis of a six factor experiment use up nearly all the available memory on the Model B.

Procpintout, along with Procheading, prints out the results of the analysis for the main effects, and Procents handles the interaction pages.

Procerror calls for interactions which can be used to estimate error variance. Given the standard order numbers of the unwanted interactions, it simply averages their mean squares. The degrees of freedom are used in three different ways for calculating error variance (dof), as a flag to check if another interaction has been added to the estimate (dof), and as an approximation with which to enter the F-ratio table (d).

Procext deals with an external estimate of error variance. The data at the end of the program consists of the probability points of the F distribution, for cases when the experiment has only 1 degree of freedom per effect, and a 90 percent confidence level is required. The F-ratios correspond to increasing degrees of freedom in the error variance estimate (up to 27 dofs) followed by one F-ratio for 28 to 59 dofs (ie, 2.85), and another for more than 59 dofs (ie, 2.75).

MAIN EFFECTS

No. Change		Effect on M.P.G.	Mean Sq
1	Increasing FUEL	1.13	2.53
2	Increasing TYRES	3.63	26.3
4	Increasing SPEED	-2.92	17.1

Error Mean Square = 0
From 0 Degrees of Freedom

Note No's of interactions you wish to use as estimate of error variance from the following tables.

Press any key to continue

1st ORDER INTERACTIONS

No. Change		Effect on M.P.G.	Mean Sq
3	FUEL TYRES	0.275	0.151
5	FUEL SPEED	0.225	0.101
6	TYRES SPEED	0.125	3.12E-2

Press any key to continue

2nd ORDER INTERACTIONS

No. Change		Effect on M.P.G.	Mean Sq
7	FUEL TYRES SPEED	0.475	0.451

Enter No's of interactions you want to use as estimate of the error variance.
('0' to finish)

Figure 2. Print out on first Pass

MAIN EFFECTS

No. Change		Effect on M.P.G.	F-ratio
1	Increasing FUEL	1.13	13.0
2	Increasing TYRES	3.63	143
4	Increasing SPEED	-2.92	93.1

Error Mean Square = 0.184
From 4 Degrees of Freedom

If F-ratio > 4.54 then effect of change is significant at 10% level.

If F-ratio = 0 then effect has been chosen to estimate error.

Figure 3. Print out on second Pass

Continued over the page

```

10 REM STATISTICS/ANALYSIS OF VARIANCE
20 REM FOR 2^N FACTORIAL EXPTS.
30 REM (C) C.R.WOODINGS/MAY 1983
40 REM FOR BBC MICRO MODEL 8
50
60 MODE7:PROCtitle
70 CLS:PRINTTAB(0,12)"Enter number of
  factors (min=2,max=6) ";
80 f=VALFNInput(1,49,55):r=2^f
90 DIM F%(f),data(f,r),name$(f),efec(r),
  mnsqr(r),lble$(r),int$(r)
100 fctr=f:rslt=r:ext=0
110 PROCdatalog
120 REPEAT:dof=0:erv=0
130 CLS:IF F%yes_no(10,12,"Edit the data")
  PROCreview
140 CLS:PRINTTAB(15,12)"COMPUTING"
  PROCanalysis
150 CLS:IF F%yes_no(1,11,"Do you have a good
  estimate of error variance from other
  trials") THEN PROCext:GOTO180
160 p=0:REPEAT:PROCprintout(p):PROCerror
  (p):p=p+1
170 UNTIL NOT F%yes_no(5,VPOS+1,
  "See the tables again")
180 UNTIL NOT F%yes_no(10,VPOS+1,
  "Another run")
190 MODE7:PROCdouble_height(11,"BYE",132)
  END
200
210 DEFPROCtitle
220 PROCdouble_height(8,"STATISTICS",132)
230 PROCdouble_height(12,"Analysis of 2^n
  Factorial Experiment",131)
240 PROCcontinue:ENDPROC
250
260 DEFPROCdouble_height(row,words$,colour)
270 column=INT((40-LEN(words$))/2)-2
280 FOR I=row TO row+1:PRINTTAB(column,I),
  CHR$(14):CHR$(colour);words$
290 NEXT:ENDPROC
300
310 DEFFNyes_no(x,y,r$)
320 LOCAL ans:PRINTTAB(x,y)AB;" (Y/N) ? ";
330 REPEAT:ans=(GET AND &DF):UNTIL ans=&59
  OR ans=&4E:PRINTCHR$(ans
  )=CHR$(ans)+"")
340
350
360 DEFPROCcontinue
370 PRINTTAB(7,23)"Press any key to
  continue ";:REPEATUNTILGET:ENDPROC
380
390 DEFFNInput(len,loASC,hiASC)
400 LOCAL K%,Z%,K%>0:In$="" :PRINT STRING$(
  len,".");STRING$(len+1,CHR$(8))," ");
  :FX15,1
410 REPEAT:Z%=GET
420 IF Z%=127 AND K%>0 THEN K%=K%+1:In$=
  LEFT$(In$,K%):VDUZX,46,8:GOTO450
430 IF Z%loASC AND K%len AND Z%hiASC
  THEN K%=K%+1:In$=In$+CHR$(Z%):VDUZX,GO
  TO450
440 IF NOT(Z%=13 AND K%>0) VDU7
450 UNTIL Z%=13 AND K%>0
460 =In$
470
480 DEFPROCreview
490 FOR N%=0 TO rslt-1
500 PROCentry("EDITING")
510 PRINT:DATA(0,N%):IF F%yes_no(8,15,
  "Change entry") THEN PRINTTAB(8,17)"NE
  W RESULT = ";:data(0,N%)=EVALFNInput
  (10,40,58)
520 NEXT:ENDPROC
530
540 DEFPROCdatalog
550 FOR N=1 TO fctr:CLS
560 PRINTTAB(3,12)"Enter a name for factor
  ";:N;" ";
570 name$(N)=FNInput(5,32,127):NEXT
580 CLS:PRINTTAB(3,12)"Enter a name for
  results.";
590 rslt=FNInput(6,32,127):CLS:PRINTTAB
  (15,12)"COMPUTING"
600 REM rest of Procedure gets results in
  standard order for Yates Method
610 X=1:R=0:REPEAT
620 FOR N%=1 TO rslt/X
630 FOR M%=1 TO X
640 IF N%DIV2<N%/2 THEN F%(R)=F%(R)+
  "Lo" ELSE F%(R)=F%(R)+"Hi"
650 NEXT:NEXT:R=2*X:R=R+1:UNTIL R=fctr
660 FOR N%=0 TO rslt-1
670 PROCentry("LOADING")
680 data(0,N%)=EVALFNInput(10,40,58)
690 NEXT:ENDPROC
700
710 DEFPROCentry(B%)
720 CLS:PRINTTAB(12,1)"DATA ";B%:PRINTTAB
  (0,11-fctr);
730 FOR X%=0 TO fctr-1:level$=MID$(F%(X%),
  N%*3+1,3)
740 PRINTTAB(10);name$(X%+1);TAB(17)"at";
  level$;" level"
750 IF B%="EDITING" THEN 780
760 IF level$="Hi" THEN level$="H" ELSE
  level$="L"
770 lble$(N%)=lble$(N%)+level$
780 NEXT:PRINT:TAB(10)"Result = ";:ENDPROC
790
800 DEFPROCanalysis total=0
810 FOR M%=0 TO fctr-1
820 FOR N%=0 TO rslt-1 STEP 2
830 data(M%+1,N%/2)=data(M%,N%)+data
  (M%,N%+1)
840 data(M%+1,N%/2+rslt/2)=data(M%,N%+1)
  -data(M%,N%)
850 NEXT:NEXT
860 FOR N%=0 TO rslt-1
870 efec(N%)=data(M%,N%)/2^(M%-1)
880 mnsqr(N%)=data(M%,N%)/2/rslt
890 NEXT:mnsqr(0)=0:ENDPROC
900
910 DEFPROCprintout(Pass) @X=&308
920 CLS:PRINT:PROCheading("MAIN EFFECTS")
930 N=1:FOR M=1 TO fctr
940 PRINT:N;TAB(3);"Increasing ";name$(M);
  TAB(23);efec(N);TAB(32);
950 IF Pass=0 THEN PRINT:mnsqr(N) ELSE
  PRINT:mnsqr(N)/erv
960 N=N*2:NEXT:PRINT:"Error Mean Square =
  ";erv:"From ";dof;"Degrees of Freedom"
970 IF Pass THEN PRINT:"If F-ratio"
  : then effect of change is sig
  nificant at >90% level." : IF F-ratio=0
  then effect has been chosen to estimate
  error."
980 IF ext OR Pass THEN 1000
990 PRINT:"Note No's of interactions you
  wish to" : use as estimate of error v
  ariance" : from the following tables."
1000 FOR N=2 TO fctr:PROCcontinue
1010 PROCints(N-1,Pass)
1020 NEXT:@X=10:ENDPROC
1030
1040 DEFPROCints(order,Pass) VDU26:CLS
1050 IF order=1 THEN S$="at" ELSE IF order=2
  THEN S$="nd" ELSE IF order=3 THE
  N S$="rd" ELSE S$="th"

```



```

1060 PRINT "order, $"; PROCHeading(" ORDER
INTERACTIONS")
1070 FOR N%=3 TO ralt: int(N%)="": flag=-1
1080 FOR X%=1 TO fctr
1090 IF MID$(tbl$(N%),X%,1)="H" THEN int(N%)=int(N%)+1: flag=flag+1
1100 NEXT
1110 IF flag=order THEN PRINT N%;TAB(2);
int(N%);TAB(23);efec(N%);TAB(32);:GOT
01120:ELSE GOTO1130
1120 IF Pass=0 THEN PRINT mnsqr(N%) ELSE
PRINT mnsqr(N%)/erv
1130 IF VPOS>21 THEN PROCContinue:VDU28,0,
24,39,5:CLS
NEXT:ENDPROC
1140
1150
1160 DEFPROCHeading(C%)
1170 PRINTC%:TAB(21)"Effect on"
1180 PRINT "No.":TAB(4)"Change":TAB(23);
ralt:TAB(32);
1190 IF Pass=0 THEN PRINT "Mean $q" ELSE
PRINT "F-ratio"
1200 PRINTSTRING(39,"_"):ENDPROC
1210
1220 DEFPROCerror(Pass) Dof=0
1230 IF ext THEN 1310
1240 IF Pass THEN PRINTTAB(2,9)"Add
interactions to error estimate? "ELSE
PRINTTAB(0,9)"Enter No's of interac

```

```

tions you want to": "use as estimate of
the error variance."
1250 PRINTTAB(12)"('0' to finish)"
1260 REPEAT:err=VALFNInput(2,40,58):VDU9,9
1270 IF err=0 OR mnsqr(err)=0 THEN 1300
1280 erv=erv+mnsqr(err)
1290 mnsqr(err)=0:dof=dof+1:Dof=dof
1300 UNTIL err=0
1310 d=dof:IF Dof=dof erv=erv/dof
1320 IF dof>27 AND dof<60 THEN d=28
1330 IF dof>60 THEN d=29
1340 FOR N%=1 TO d:READ f_ratio:NEXT
1350 RESTORE:ENDPROC
1360
1370 DEFPROCext
1380 ext=-1:CLS:PRINTTAB(1,12)"Enter the
error variance estimate "
1390 erv=VALFNInput(5,40,58)
1400 CLS:PRINTTAB(1,12)"Enter the degrees
of freedom on which this error va
riance is based."
1410 dof=VALFNInput(5,40,58)
1420 PROCerror(1):PROCPrintout(1):ENDPROC
1430
1440 DATA 39.9,8.53,5.54,4.54,4.06,3.78,3.59,
3.46,3.36,3.28,3.23,3.18,3.14
1450 DATA 3.1,3.07,3.05,3.03,3.01,2.99,2.97,
2.96,2.95,2.94,2.93,2.92,2.91
1460 DATA 2.90,2.85,2.75:REM 90% Probability
points of f_ratio for 1 to 27,27,
and >59 degrees of freedom

```

Home Computer Show

Birmingham

JUNE SATURDAY 4th (10am-6pm)
SUNDAY 5th (10am-4pm)

THE
METROPOLE HOTEL
AT THE
NATIONAL
EXHIBITION CENTRE

VISIT THE COMPLETE SHOW FOR THE HOME USER AND SEE:

A COMPLETE cross section of all hardware and software available to the home user.

A FULL RANGE of home computers priced from £50 upwards.

A COMPUTER ADVICE CENTRE run by independent experts for the answers to all your questions.

WIN WIN WIN TWO COMPUTERS — one for you, one for a school of your choice
— to be won at each show. FREE entry form with advance tickets

SPONSORED JOINTLY BY:

ADULTS: £2.00
UNDER 8s & OAPs: FREE
25% DISCOUNT for parties of
20 or more

ASB Computing
Computing Today Personal Software
Personal Computing Today
Home Computing Weekly
ZX Computing


PCWk

BIRMINGHAM
Home Computer Show
Send £1.00 Save £1.00 One person per coupon only

Mr. Mrs. Miss
Address

ASP Exhibitions
145 Charing Cross Road
London WC2H 0EE
01-437 1002


NOW YOU CAN LIFT STATIC DRAWINGS, PHOTOGRAPHS, ETC RIGHT OFF THE PAPER AND BRING THEM TO LIFE INTO YOUR PROGRAM!



FROM PAPER TO SCREEN...
...AND INTO YOUR PROGRAM.

POWER GRAPHICS

ACTION-TRACER + **GHOST-WRITER**
IMAGE-TRANSFER SYSTEM PROGRAM COMPILER




TWO POTENT FEATURES COMBINE TO BRING YOU UNIQUE NEW POWER OVER YOUR SPECTRUM GRAPHICS!

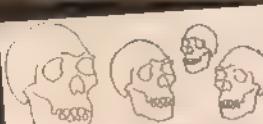
● ACTION-TRACER Give the power to transfer drawings, photographs, paintings, lettering - in fact ANY paper-based images into full colour line drawings on your Spectrum screen, with astonishing ease and an accuracy that rivals expensive digital tracers. But this time you get more than just a static on-screen design that has to be laboriously drawn on and off tape, because...

● GHOST-WRITER Interprets your on-screen design into the precise sequence of basic instructions needed to EXACTLY reproduce it, and then writes the program for you, directly into memory! New program lines appear in your listing which are indistinguishable from ones you might have written yourself. When you've finished, POWER-GRAFICS will 'self-destruct' leaving behind only your new program line ready to use.

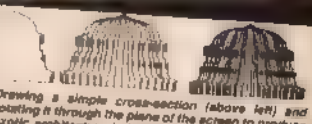
TOGETHER THEY'RE DYNAMIC!
The new program captures your design DYNAMICALLY, giving you instantly the power to MOVE it anywhere, to SHRINK it down to a single pixel, or EXPAND it to fill the screen. You can SQUEEZE or STRETCH it into weird distortions. No UP UPSIDE DOWN or MIRROR-IMAGE it, ROTATE it in the plane of the screen... In other words MANIPULATE IT UNDER YOUR FULL CONTROL!



Once GHOST-WRITER has captured Space-Shuttle, you can immediately reproduce it anywhere, any size, AND redesign it too!




No problem producing mirror-images... and turning them upside-down is just as easy, too!



Drawing a simple cross-section (above left) and routing it through the plane of the screen to produce exotic architecture is just a peep into a whole new world of exciting, inventive graphics made easy as ABC by GHOST-WRITER's versatile programming.

MANIPULATION OR ANIMATION - GHOST-WRITER ALWAYS WRITES EXACTLY THE PROGRAM YOU NEED!
You can tell GHOST-WRITER to program selected parts of your design with their own special line numbers, allowing you to call them as separate sub-routines. Thus you can add or remove parts at will - like the Bunsen burner in this chemistry program.




Animating the lips of this well-known newscaster (recognises her?) is just as simple - and thanks to POWER-GRAFICS' ability to produce high-speed curves when needed (which draw as fast as straight!) her curved lips can be animated in real time!

INSTANT FORGERY!
How would you like to write a program that signs your name exactly as you do yourself?

John Smith

It's just a few minutes' fun with POWER-GRAFICS!



POWER-GRAFICS is fun to use, simple in operation, and for beginners and advanced users alike is an important new programming tool that extends the Spectrum's potential for imaginative graphics into exciting new regions. IF YOU WANT PICTURES YOU CAN USE, IT HAS TO BE POWER-GRAFICS.

MORE 'USER-FRIENDLY' PROGRAMS TO EXTEND YOUR HORIZONS!

AUTO-SONICS WILL BRING YOUR PROGRAM ALIVE WITH EXCITING SOUND-EFFECTS!

- 26 built-in effects: animals, engines, sirens, phone, space-sounds, etc.
- Use them just as they come, or use the graphic SYNTHESIZER CONTROL PANEL to bend and twist and shape them into thousands of unique new effects.
- AUTO-SONICS turns your sound-designs into program lines that will exactly reproduce them - in YOUR program! "A very powerful program - so simple to alter and amend the sound. The ease of use amazes me!" (EDUCATIONAL COMPUTING). "A cleverly written program" (MCW). Winner of "WHIZZ KID '82". Cassette/instructions only £4.99. (Also available for TRS80 - state machine.)

TYPESETTER Simply puts breathtaking, professional quality titles on to your programs, or cassette labels, letterheads, adverts, etc on to your printer. Instant control or character shape and size, ink and paper, Cursor-controlled positioning. Dazzling displays for only £3.99.

GRAFFIX User-defined graphics made ultra-easy. Totally user-friendly. Continuous menu display of multi-functions. Whatever you think you might want to do, this program does it at a keystroke! PRODUCES UGGS THAT SCREENS WILL RECOGNISE!! sheer convenience for only £3.99.

RELAX WITH OUR RANGE OF QUALITY SPECTRUM GAMES

STAR-PACK - 4 QUALITY PROGRAMS + ACTION + COLOUR + SOUND!
3-D MAZE... Huge 30 x 30 random maze, timer display. Fast action. This is as good as the ones with fancy names! + LUNAR LANDER Random surface, hi-res, action, space-age displays! + FRUIT MACHINE Top-notch colour graphics, accurate sound, all casual features! + 3-D CITY BOMBER All hi-res graphics. Blast the city and land the craft! HOURS OF SHEER ENTERTAINMENT FOR £3.99.

SCRAMBLE - CONDITION RED Fast all M.C. action. 8-way controls. Detailed hi-res graphics... missiles... bombs... fuel dumps... missions... high-score... sound... etc... etc. Arcade action for £4.99.

DEMON NIM

The age old game brought bang up to date with hi-res. graphics and great sound. It's you against the computer for only £4.50.



WINGED AVENGERS Superb M.C. arcade action - 3 moves... even attack... mother ship retreating. Colour + sound. "One of the best..." (YOUR COMPUTER). "Five star quality" (PCW). Breathtaking FUN for only £4.50.

GULPMAN "One of the few I would buy - well worth the price" (PCW). 15 INSTANTLY displayed mazes. 9 skill levels and speeds from gentle to ridiculous. User-selected control keys. Great sound, all M.C. NOW ONLY £4.99.
HIGH-NOON Cecil, coffin, weapons, Death-March. Single-shot and rapid fire. 2-player, or playervscomputer. GREAT GUNFIGHTS FOR ONLY £4.50.

IF YOU ARE ORDERING TWO OR MORE CASSETTES, PLEASE DEDUCT 50p DISCOUNT FROM 2nd AND SUBSEQUENT ITEMS

BUTTERCRAFT SOFTWARE

14 Western Avenue, Riddlesden, Keighley, Yorks. ENGLAND

PLEASE ASK FOR OUR ILLUSTRATED LIST OF GUARANTEED-QUALITY TRS80/VIDEO GENIE SOFTWARE

AMAZING NEW PRODUCT TELESOUND 84 SPECTRUM SOUND BOOSTER

Telesound 84 outputs the computer sound direct through your unmodified TV set. Sound effects then can be controlled from a whisper to a roar. Three easy snap-on connections eliminate soldering.

Telesound 84 measures 2½ x 2 x 1½ cm. and requires no separate power supply. This unique device (patent pending) uses some of the very latest ultra miniature components and costs only £9.95 inclusive of post, packing, etc.

Full instructions with connection diagrams are supplied so that the unit can be fitted in minutes without any previous experience.

Cheques/PO to
COMPUSOUND
32 Langley Close
Redditch, Worcs. B98 0ET
Please state your computer when ordering

NEW

Extend the sound
capabilities
of your Dragon

**FOR
DRAGON 32**

—DRAGON 32— SOUND EXTENSION MODULE

- Fully-cased Module plugs into cartridge port
- Provides 3 channels of sound: 3-note chords and harmonies over 5 octaves
- Uses new BASIC command. No need to 'Peek' or 'Poke'
- Many built-in sound effects (eg bomb, laser)
- Music and graphics can occur together without loss of speed
- Based on popular, well-proven sound generator
- Two Input/Output ports included
- User manual provided, with examples

**ONLY
£34.95
Inclusive**

Cheques/POs/  to:

J.C.B. (MICROSYSTEMS)
29 SOUTHBORNE ROAD
BOURNEMOUTH BH6 5AE
Tel: (0202) 423973







Write or phone for further details



**SPECTRUM
GOES
FORTH
WITH
ABERSOFT**

£14.95

The affordable FORTH

- | | | |
|---|---|--|
|  | Forth: A full implementation of this very fast running language. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum  used. Future Microdrive enhancements will be made available. 48K Spectrum only. | 4.95
19.95 |
|  | Chess 1.4: 10 levels m/c. Graphic screen display. 16K ZX81 only. | 8.95 |
|  | Invaders: Very fast m/c action. Includes mystery ship and increasingly difficult screens. 16K ZX81 only. | 4.45 |
|  | Mazeman: A fast action m/c game that reproduces the spirit of the original. The Spectrum version includes excellent graphics and sound. 16K ZX81 and 16/48K Spectrum. | ZX81
4.45 4.95 |
|  | Adventure 1: Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed Sinclair User, Iss.2. Features save game routine as the game can literally take months to complete. 16K ZX81 and 48K Spectrum. | ZX
8.95 9.95 |

ABERSOFT

7 MAES AFALLEN, BOW ST, DYFED, SY24 5BA

24 hour Answerphone for Access orders on 0970 828851



OPEN FORUM

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Jackpot

on ZX81

The screen displays a fruit machine and all



the winning combinations possible. These can very easily be changed by changing lines 20 to line 35.

Line 47 to line 79 choose three different reels at random to be displayed for the

winnings. These can also very easily be changed by altering line 47. Add as many characters to the variable B\$ as you like, then alter line 50 (let $J = \text{Int}(\text{Rnd}?) + 1$). The question mark should always be one more than the amount of characters in B\$.

When all this is done and it is exactly as you desire it to be, save it on tape by typing *Goto 120*. You are now ready to run it. Hit key "F" to spin the reels.

Graphics note

Line 47 = OX* (SHIFT  (SHIFT  (INV SPACE)
(SHIFT Y) (INV £) (INV ?).

LISTING FROM JACKPOT I

```

1 2 REM "JACKPOT"
3 PRINT
4 PRINT
5 PRINT
6 PRINT
7 PRINT
8 PRINT
9 PRINT
10 PRINT
11 PRINT
12 PRINT
13 PRINT
14 PRINT
15 PRINT
16 PRINT
17 PRINT
18 PRINT
19 PRINT
20 PRINT AT 0,12;"  0 0 0
1, 21 PRINT ""
22 PRINT AT 2,12;"  0 0 0
3 23 PRINT ""
24 PRINT AT 4,12;"  0 0 0
5 25 PRINT ""
26 PRINT AT 6,12;"  0 0 0
7 27 PRINT AT 8,12;"  0 0 0
9 28 PRINT AT 10,12;"* 0 0
0 29 PRINT AT 12,12;"- 0 0
1 30 PRINT AT 14,12;"* 0 0
2 31 PRINT AT 16,12;"  0 0 -
3 32 PRINT AT 18,12;"  0 - -
4 33 PRINT AT 20,12;"* - -
5 34 PRINT AT 22,12;"* - -
6 35 PRINT AT 24,12;"* - -
7 36 PRINT AT 26,12;"* - -
8 37 PRINT AT 28,12;"* - -
9 38 PRINT AT 30,12;"* - -
0 39 PRINT AT 32,12;"* - -
1 40 PRINT AT 34,12;"* - -
2 41 PRINT AT 36,12;"* - -
3 42 PRINT AT 38,12;"* - -
4 43 PRINT AT 40,12;"* - -
5 44 PRINT AT 42,12;"* - -
6 45 PRINT AT 44,12;"* - -
7 46 PRINT AT 46,12;"* - -
8 47 PRINT AT 48,12;"* - -
9 48 PRINT AT 50,12;"* - -
0 49 PRINT AT 52,12;"* - -
1 50 PRINT AT 54,12;"* - -
2 51 PRINT AT 56,12;"* - -
3 52 PRINT AT 58,12;"* - -
4 53 PRINT AT 60,12;"* - -
5 54 PRINT AT 62,12;"* - -
6 55 PRINT AT 64,12;"* - -
7 56 PRINT AT 66,12;"* - -
8 57 PRINT AT 68,12;"* - -
9 58 PRINT AT 70,12;"* - -
0 59 PRINT AT 72,12;"* - -
1 60 PRINT AT 74,12;"* - -
2 61 PRINT AT 76,12;"* - -
3 62 PRINT AT 78,12;"* - -
4 63 PRINT AT 80,12;"* - -
5 64 PRINT AT 82,12;"* - -
6 65 PRINT AT 84,12;"* - -
7 66 PRINT AT 86,12;"* - -
8 67 PRINT AT 88,12;"* - -
9 68 PRINT AT 90,12;"* - -
0 69 PRINT AT 92,12;"* - -
1 70 PRINT AT 94,12;"* - -
2 71 PRINT AT 96,12;"* - -
3 72 PRINT AT 98,12;"* - -
4 73 PRINT AT 100,12;"* - -
5 74 PRINT AT 102,12;"* - -
6 75 PRINT AT 104,12;"* - -
7 76 PRINT AT 106,12;"* - -
8 77 PRINT AT 108,12;"* - -
9 78 PRINT AT 110,12;"* - -
0 79 PRINT AT 112,12;"* - -
1 80 PRINT AT 114,12;"* - -
2 81 PRINT AT 116,12;"* - -
3 82 PRINT AT 118,12;"* - -
4 83 PRINT AT 120,12;"* - -
5 84 PRINT AT 122,12;"* - -
6 85 PRINT AT 124,12;"* - -
7 86 PRINT AT 126,12;"* - -
8 87 PRINT AT 128,12;"* - -
9 88 PRINT AT 130,12;"* - -
0 89 PRINT AT 132,12;"* - -
1 90 PRINT AT 134,12;"* - -
2 91 PRINT AT 136,12;"* - -
3 92 PRINT AT 138,12;"* - -
4 93 PRINT AT 140,12;"* - -
5 94 PRINT AT 142,12;"* - -
6 95 PRINT AT 144,12;"* - -
7 96 PRINT AT 146,12;"* - -
8 97 PRINT AT 148,12;"* - -
9 98 PRINT AT 150,12;"* - -
0 99 PRINT AT 152,12;"* - -
1 100 PRINT AT 154,12;"* - -
2 101 PRINT AT 156,12;"* - -
3 102 PRINT AT 158,12;"* - -
4 103 PRINT AT 160,12;"* - -
5 104 PRINT AT 162,12;"* - -
6 105 PRINT AT 164,12;"* - -
7 106 PRINT AT 166,12;"* - -
8 107 PRINT AT 168,12;"* - -
9 108 PRINT AT 170,12;"* - -
0 109 PRINT AT 172,12;"* - -
1 110 PRINT AT 174,12;"* - -
2 111 PRINT AT 176,12;"* - -
3 112 PRINT AT 178,12;"* - -
4 113 PRINT AT 180,12;"* - -
5 114 PRINT AT 182,12;"* - -
6 115 PRINT AT 184,12;"* - -
7 116 PRINT AT 186,12;"* - -
8 117 PRINT AT 188,12;"* - -
9 118 PRINT AT 190,12;"* - -
0 119 PRINT AT 192,12;"* - -
1 120 PRINT AT 194,12;"* - -
2 121 PRINT AT 196,12;"* - -
3 122 PRINT AT 198,12;"* - -
4 123 PRINT AT 200,12;"* - -
5 124 PRINT AT 202,12;"* - -
6 125 PRINT AT 204,12;"* - -
7 126 PRINT AT 206,12;"* - -
8 127 PRINT AT 208,12;"* - -
9 128 PRINT AT 210,12;"* - -
0 129 PRINT AT 212,12;"* - -
1 130 PRINT AT 214,12;"* - -
2 131 PRINT AT 216,12;"* - -
3 132 PRINT AT 218,12;"* - -
4 133 PRINT AT 220,12;"* - -
5 134 PRINT AT 222,12;"* - -
6 135 PRINT AT 224,12;"* - -
7 136 PRINT AT 226,12;"* - -
8 137 PRINT AT 228,12;"* - -
9 138 PRINT AT 230,12;"* - -
0 139 PRINT AT 232,12;"* - -
1 140 PRINT AT 234,12;"* - -
2 141 PRINT AT 236,12;"* - -
3 142 PRINT AT 238,12;"* - -
4 143 PRINT AT 240,12;"* - -
5 144 PRINT AT 242,12;"* - -
6 145 PRINT AT 244,12;"* - -
7 146 PRINT AT 246,12;"* - -
8 147 PRINT AT 248,12;"* - -
9 148 PRINT AT 250,12;"* - -
0 149 PRINT AT 252,12;"* - -
1 150 PRINT AT 254,12;"* - -
2 151 PRINT AT 256,12;"* - -
3 152 PRINT AT 258,12;"* - -
4 153 PRINT AT 260,12;"* - -
5 154 PRINT AT 262,12;"* - -
6 155 PRINT AT 264,12;"* - -
7 156 PRINT AT 266,12;"* - -
8 157 PRINT AT 268,12;"* - -
9 158 PRINT AT 270,12;"* - -
0 159 PRINT AT 272,12;"* - -
1 160 PRINT AT 274,12;"* - -
2 161 PRINT AT 276,12;"* - -
3 162 PRINT AT 278,12;"* - -
4 163 PRINT AT 280,12;"* - -
5 164 PRINT AT 282,12;"* - -
6 165 PRINT AT 284,12;"* - -
7 166 PRINT AT 286,12;"* - -
8 167 PRINT AT 288,12;"* - -
9 168 PRINT AT 290,12;"* - -
0 169 PRINT AT 292,12;"* - -
1 170 PRINT AT 294,12;"* - -
2 171 PRINT AT 296,12;"* - -
3 172 PRINT AT 298,12;"* - -
4 173 PRINT AT 300,12;"* - -
5 174 PRINT AT 302,12;"* - -
6 175 PRINT AT 304,12;"* - -
7 176 PRINT AT 306,12;"* - -
8 177 PRINT AT 308,12;"* - -
9 178 PRINT AT 310,12;"* - -
0 179 PRINT AT 312,12;"* - -
1 180 PRINT AT 314,12;"* - -
2 181 PRINT AT 316,12;"* - -
3 182 PRINT AT 318,12;"* - -
4 183 PRINT AT 320,12;"* - -
5 184 PRINT AT 322,12;"* - -
6 185 PRINT AT 324,12;"* - -
7 186 PRINT AT 326,12;"* - -
8 187 PRINT AT 328,12;"* - -
9 188 PRINT AT 330,12;"* - -
0 189 PRINT AT 332,12;"* - -
1 190 PRINT AT 334,12;"* - -
2 191 PRINT AT 336,12;"* - -
3 192 PRINT AT 338,12;"* - -
4 193 PRINT AT 340,12;"* - -
5 194 PRINT AT 342,12;"* - -
6 195 PRINT AT 344,12;"* - -
7 196 PRINT AT 346,12;"* - -
8 197 PRINT AT 348,12;"* - -
9 198 PRINT AT 350,12;"* - -
0 199 PRINT AT 352,12;"* - -
1 200 PRINT AT 354,12;"* - -
2 201 PRINT AT 356,12;"* - -
3 202 PRINT AT 358,12;"* - -
4 203 PRINT AT 360,12;"* - -
5 204 PRINT AT 362,12;"* - -
6 205 PRINT AT 364,12;"* - -
7 206 PRINT AT 366,12;"* - -
8 207 PRINT AT 368,12;"* - -
9 208 PRINT AT 370,12;"* - -
0 209 PRINT AT 372,12;"* - -
1 210 PRINT AT 374,12;"* - -
2 211 PRINT AT 376,12;"* - -
3 212 PRINT AT 378,12;"* - -
4 213 PRINT AT 380,12;"* - -
5 214 PRINT AT 382,12;"* - -
6 215 PRINT AT 384,12;"* - -
7 216 PRINT AT 386,12;"* - -
8 217 PRINT AT 388,12;"* - -
9 218 PRINT AT 390,12;"* - -
0 219 PRINT AT 392,12;"* - -
1 220 PRINT AT 394,12;"* - -
2 221 PRINT AT 396,12;"* - -
3 222 PRINT AT 398,12;"* - -
4 223 PRINT AT 400,12;"* - -
5 224 PRINT AT 402,12;"* - -
6 225 PRINT AT 404,12;"* - -
7 226 PRINT AT 406,12;"* - -
8 227 PRINT AT 408,12;"* - -
9 228 PRINT AT 410,12;"* - -
0 229 PRINT AT 412,12;"* - -
1 230 PRINT AT 414,12;"* - -
2 231 PRINT AT 416,12;"* - -
3 232 PRINT AT 418,12;"* - -
4 233 PRINT AT 420,12;"* - -
5 234 PRINT AT 422,12;"* - -
6 235 PRINT AT 424,12;"* - -
7 236 PRINT AT 426,12;"* - -
8 237 PRINT AT 428,12;"* - -
9 238 PRINT AT 430,12;"* - -
0 23
```

```

45 IF INKEY$ <> "R" THEN GOTO 48
47 LET B$ = "OX# "
48 DIM B$(3)
49 FOR I = 1 TO 3
50 LET J = INT (RND*10) + 1
51 LET A$(I) = B$(J)
52 NEXT I
53 FOR I = 1 TO 3
54 LET J = 1 TO 3
55 PRINT AT 7, 0+2*I, D$(I)
56 LET J
57 IF RND < .5 THEN GOTO 32
58 PRINT AT 7, 0+2*I, A$(I)
59 NEXT I
60 IF INKEY$ <> "R" THEN GOTO 46
61 GOTO 46
62 RUN
63 STOP
64 SAVE "CHECKPU"
65 END

```

EXAMPLE FROM JACKPOT 3

Jackpot
by Peter Morton

Prison

on BBC

This program will produce a prism, which will rotate first in one direction, then the

other. The speed is controlled by the number added \square A \square the subroutines.

By adding a few points, a cube or more complex shape could be made.

Program notes

■ Cursor off

18-31 Draws the prism

■ This colour is easier on the eyes than normal white.

39 Draws the innermost square

40-49 Decides which subroutine to use

CALLS appropriate subroutine

1000, 2000 Subroutines. Try altering the numbers.

```

5  VDU23;8202;0;0;0;
10 A=100;GDS=1000
11 XXX=100
15 MODE4
17 C=A+600
18 MOVE A+XXX,500:DRAW C+XXX,500
20 MOVE A+XXX,500:DRAWA,900
21 MOVE C+XXX,500:DRAWC,900
30 MOVE C+XXX,500:DRAWC,300
31 MOVE A+XXX,500:DRAW A,300
32 GCLO.1

```

```

39 DRAWA,900:DRAWC,900:DRAWC,300:
   DRAWA,300:GOTO,2
40 IF A+800>1280 THEN GOS=2000
48 IF A<0 THEN GOS=1000
49 IF XXX=1200 THEN GOS=1000
51 GOSUB GOS
55 GOTO15
1000 A=A+10:XXX=XXX-10:RETURN
2000 A=A-10:XXX=XXX+10:RETURN

```

Prism
by M Weatherill

Lunar Lander

on Spectrum

In the game you are a ground-based flight controller responsible for the guidance and safe landing of several modules returning to the moon's surface at bases A and B.

More points are awarded for landing at

B, as it is more difficult than landing at A. The real problem is bringing the landing speed of the modules down to required limits before fuel is used up.

Once a module has crashed the game is over.

Program notes

User defined graphics: 1-2, 2026.

Draws scenery: 10, 100, 2001, 2025, 9813 & 9825.

Sets up variables: 110, 306, 2027.

Movement of module: 140-155, 300 & 310, 2020-2023, 2030, 9821-9835.

Draws border: 2013.

Checks module striking scenery: 305 & 2029.

Prints red border — fuel low: 311 & 2031.

Module landing: 2040.

Instructions: 9999.

Module crash routine: 9998-9999.

```

1 LET Q1=0: GO SUB 9999: PAUS
= 0: CLS: GO SUB 9902: FOR X=0
TO 7: READ A: POKE USR "A"+X,A:
NEXT X: DATA 126,195,255,126,24,
36,66,231: LET A=1: LET B=1: POK
E 23558,8: LET SCORE=0: FOR X=0
TO 7: READ A: POKE USR "D"+X,A:
NEXT X: DATA 3,31,56,63,63,31
5R "C"+X,A: NEXT X: DATA 192,248
,60,252,252,252,248,224
2 FOR X=0 TO 7: READ A: POKE
USR "E"+X,A: NEXT X: DATA 192,22
,112,56,28,62,0,0: FOR X=0 TO 7
: READ A: POKE USR "D"+X,A: NEXT
X: DATA 3,7,14,20,55,124,0,0
10 CLS: PLOT 0,55: DRAW 24,0:
DRAW 8,0: DRAW 16,0: DRAW 0,2
: DRAW 16,0: DRAW 56,84: DRAW 24
: DRAW 0,24: DRAW 0,41: DRAW 16,36: D
RAW 8,0: DRAW 12,56: DRAW 20,4:
DRAW 8,52: DRAW 48,8: DRAW 16,8
100 PRINT AT 15,8: "": AT 14,20:
"
110 LET FUEL=35: LET SPEED=0: L
ET A=1: LET B=2
140 IF INKEY$="" THEN LET B=B+1
LET SPEED=SPEED+1: PRINT AT A-
1,B-1: "": AT A,B: PRINT AT A
,B+1: "": AT A,B+1
141 IF FUEL<0 THEN BORDER 2
142 IF INKEY$="" THEN PRINT AT
A,B+1: "": LET FUEL=FUEL-2
143 IF INKEY$="" AND B<100 THEN
LET FUEL=FUEL-5: LET SPEED=SPE
ED+5: PRINT AT A,B+1: "": LET B
=B+1: BEEP .1,20
150 IF INKEY$="" AND B>0 THEN
LET FUEL=FUEL-6: PRINT AT A,B+1
: "": LET SPEED=SPEED+5: LET B=
B-1: BEEP .1,20
151 PRINT AT 3,17: BRIGHT 1: IN
K 2: "": BRIGHT 0
155 IF INKEY$="" AND A>0 THEN
PRINT AT A,B+1: "": LET SPEED=SP
ED-3: LET FUEL=FUEL-1: LET A=A-
1: BEEP .1,20
300 IF A=14 AND B=5 OR A=14 AND
B=4 THEN CLS: GO TO 9900
301 PLOT 248,0: DRAW 0,175: PLO
T 0,175: DRAW 0,175
302 IF FUEL<0 THEN LET FUEL=0
303 IF SPEED<1 THEN LET SPEED=3
SPEED+4
304 PRINT AT 3,17: BRIGHT 1: IN
K 2: "": BRIGHT 0
305 IF SCREENS (A,B)<>"" THEN
FOR I=0 TO 7: POKE USR "Q"+I,AND
+255: NEXT I: PRINT AT A,B+1: IN
K 6: "": FOR I=1 TO 100: NEXT I:
CLS: GO TO 9900
306 PRINT AT 0,0: "VELOCITY (" SP
EED,") FUEL (" FUEL,") SCORE (" SC
ORE,") FUEL (" FUEL,") FUEL (" FUEL,")
0,15: PRINT AT A,B+1: "": NEXT I
310 IF A=10 AND B=20 OR A=10 AN
D B=19 THEN GO TO 2000
311 IF FUEL<1 THEN LET A=A+1: P
RINT AT A-1,B+1: "": AT A,B+1: "R"
: GO TO 300
9900 GO TO 111
2001 C5: IF Q1=0 THEN PLOT 152
,0: DRAW 55,18: DRAW 0,15: DRAW
-8,0: DRAW 15,48: DRAW 0,32: DRA
W 0,40: DRAW 30,0: PLOT 40,0: D
RAW 0,24: DRAW 8,0: DRAW 0,15: D
RAW 16,64: DRAW -24,40: DRAW -56
,0: LET Q=3: LET U=15: PRINT AT
0,0: "": AT 0-1,U: "
2013 PLOT 0,0: DRAW 255,0: DRAW
0,156: DRAW -255,0: DRAW 0,-156
2020 IF INKEY$="" THEN PRINT AT
0,0-1: "": AT 0-1,U-1: "": AT 0-1
,U+2: "": AT 0,U+2: "": LET U=U+1
2021 IF INKEY$="" THEN PRINT AT
0,0-2: "": AT 0-1,U+2: "": AT 0,U
-1: "": AT 0-1,U-1: "": LET U=U-1
2022 IF INKEY$="" AND 0-1>1 THE
N LET Q=0-1: PRINT AT 0-1,U: "

```

```

: LET SPEED=SPEED-3: LET FUEL=FU
EL-1
2023 IF INKEY$="" THEN LET Q=0+1
: PRINT AT 0-2,U: "": LET SPEED
=SPEED+1
2024 PRINT AT 0,U: "": AT 0-1,U:
"
2025 IF Q=10 AND Q1=0 THEN CLS:
LET Q1=1: LET Q=3: IF Q1=1 THEN
PLOT 120,32: DRAW INK 3,16,0: P
LOT 120,16: DRAW 16,0: DRAW 0,0:
DRAW 40,0: DRAW -16,32: DRAW 0,
32: DRAW -16,24: DRAW -8,16: DRA
W 8,40: PLOT 120,16: DRAW 0,0: D
RAW -24,0: DRAW -32,48: DRAW 24,
40: DRAW -24,32: DRAW -16,32
2026 PRINT AT 0,U: "": AT 0-1,U:
"
2027 IF SPEED<1 THEN LET SPEED=0
2028 IF FUEL<1 THEN LET FUEL=0
2029 IF SCREENS (0+1,U) ("") AND
ATTR (0+1,U) (<3) THEN GO TO 9998
IF SCREENS (0+1,U+1) ("") AND
ATTR (0+1,U+1) (<3) THEN GO TO 999
8: IF SCREENS (0,U-1) ("") AND A
TTTR (0,U) (<3) THEN GO TO 9998: IF
SCREENS (0,U+2) ("") AND ATTR (
0,U) (<3) THEN GO TO 9998
2030 IF INKEY$="" THEN PRINT AT
0,U: "": AT 0-1,U: "": LET FUE
L=FUEL-2
2031 PRINT AT 1,0: "VELOCITY (" SP
EED,") FUEL (" FUEL,") SCORE (" S
CORE,") IF FUEL<2 THEN PRI
NT AT 0-2,U: "": AT 0-1,U: "":
LET Q=0+1: GO TO 2024
2032 PRINT AT 1,0: "VELOCITY (" SP
EED,") FUEL (" FUEL,") SCORE (" SC
ORE,") IF SPEED<0 THEN LET
SPEED=3
2033 PRINT AT 0,U-2: "": PRINT A
T 0,U-1: "": AT 0-1,U-1: "": AT 0,
U+2: "": AT 0-1,U+2: "":
2040 IF Q=15 AND U=15 AND Q1=1 A
ND SPEED<5 AND SPEED>0 THEN PRIN
T AT 0-1,U: "": AT 0,U: "": PRI
NT AT 0-1,U: "": DRAW INK 3,16,0: LE
T SCORE=SCORE+4: FOR F=0 TO 150:
NEXT F: GO TO 9911
2041 IF FUEL<10 THEN BORDER 2
9997 GO TO 2010
9998 STOP
9999 CLS: BORDER 0: PAPER 0: IN
K 7: CLS: PRINT AT 21,0: "Press
any key": PRINT AT 0,11: "MESSAGE
TO": AT 2,0: FLASH 1: AT 4,0: "BY DRAU
D DYER": PAGE 11: AT 4,0: "THE KE
YS ARE AS FOLLOWS": AT 12,10: "0-
RIGHT": AT 14,10: "5-LEFT": AT 16,
10: "6-HOLD": AT 18,10: "7-THRUST":
RETURN
9900 CLS: PRINT AT 6,2: "END OF
MISSION": AT 10,2: "MODULE DESTROY
ED": AT 12,2: "COLLISION VELOCITY
UAS": SPEED:
SCORE IS " KNOTS": AT 16,2: "YOUR
9901 STOP
9902 CLS: PLOT 16,149: DRAW 176
0: PRINT AT 2,2: "TOUCH DOWN VEL
OCITIES": AT 5,2: "BASE A 0-2 K
NOTS. SCORE+2": PRINT AT 7,2: "B
ASE B 0-5 KNOTS. SCORE+4": A
T 21,0: "Press any key to contact
module": PAUSE 0: CLS: RETURN
9813 LET Q=3: LET H=12: PRINT AT
9-1,H+1: "": AT 9,H+1: "": LET U=U+1
9814 PRINT AT 1,1: "VELOCITY (" SP
EED,") FUEL (" FUEL,") FUEL (" FUEL,")
AT 3,1: "SCORE (" SCORE,")
9815 PLOT 0,32: DRAW 70,16: DRAW
24,40: DRAW 0,32: DRAW 40,0: D
RAW 0,40: DRAW 24,-24: DRAW 48,0
: DRAW -8,-64
9820 PRINT AT 9-1,H+2: "": AT 9,H
+2: "": PLOT 0,0: DRAW 255,0: DRA
W 0,175: DRAW -255,0: DRAW 0,-1
75

```



```

9821 IF INKEY$="" THEN LET g=g+1
    LET SPEED=SPEED+1: PRINT AT g-
    2,h:
9822 IF INKEY$="7" AND g-1>3 AND
    SPEED>0 THEN LET SPEED=SPEED-2:
    LET FUEL=FUEL-1: LET g=g-1: PRI
    NT AT g+1,h:
9823 IF INKEY$="5" AND h>5 THEN
    LET h=h-1: PRINT AT g,h+2: "AT
    g-1,h+2:
9824 IF INKEY$="6" AND h<25 THEN
    LET h=h+1: PRINT AT g,h-1: "AT
    g-1,h-1:
9825 PLOT 0,32: DRAW 70,16: DRAW
    24,40: DRAW 0,-32: DRAW 40,0: D
    RAW 0,40: DRAW 24,-24: DRAW 48,0
    : DRAW -8,-54
9827 IF SPEED<0 THEN LET SPEED=5
    SPEED+4
9829 IF INKEY$="8" THEN PRINT AT
    g-1,h: "AT g,h: "AT g,h: LET FUE
    L=FUEL-2
9830 IF FUEL<0 THEN LET FUEL=0:
    IF FUEL<1 THEN LET g=g+1: PRINT
    AT g-2,h: "AT g,h: "AT g,h:
    AT g-1,h: "AT g,h: IF SCREEN$ (g+1,
    h)<0 THEN GO TO 9999: IF SCRE
    ENS (g+1,h+1)<0 THEN GO TO 99
    99: GO TO 9825
9832 IF SCREEN$ (g,h-1)<0 AND
    ATTR (g,h)<3 THEN GO TO 9999
9833 IF SCREEN$ (g,h+2)<0 AND
    ATTR (g,h)<3 THEN GO TO 9999
9834 PRINT AT g,h-1: "AT g-1,h
    -1: "AT g-1,h: "AT g
    9835 PLOT INK 3,104,64: DRAW INK
    3,16,0: IF g=13 AND h=13 AND SP
    EED>0 AND SPEED<3 THEN PAUSE 0:
    LET SCORE=SCORE+2: FOR F=0 TO 20
    0: NEXT F: CLS: GO TO 9900

```

```

9836 PRINT AT 1,1:"VELOCITY("5P
    EED:") AT 2,1:"FUEL("FUEL:")
    AT 3,1:"SCORE("SCORE:")
9837 IF FUEL<10 THEN BORDER 2
9800 GO TO 9820
9811 BORDER 0: CLS: PAUSE 50: F
    RINT AT 10,0:"ALPHA-CORRECT SURF
    ACE CONTACT: AT 11,0:"STANDBY C
    ONTROLLER FOR NEXT MODULE AR
    RIVING ON SCHEDULE: "Press any
    key to contact next module":
    PAUSE 0: GO TO 10
9900 BORDER 0: FOR F=0 TO 9: FOR
    X=1 TO 8: POKE USR "0"+X,RND#25
    5: NEXT X: PRINT AT 0,U-1: INK 6
    6: FLASH 1: "AT 0-1,U-1: INK 6:
    F: PRINT AT 0,U: "AT 0-1,U:
    CLS: FOR F=0 TO 21: PAUSE
    5: PRINT AT F,0:"END OF MISSION
    AT F-1,0: "NEX
    T F: PRINT AT 10,0:"Press any ke
    y for another game": PAUSE 0: RU
    N
9999 BORDER 0: FOR F=0 TO 10: FO
    R X=0 TO 7: POKE USR "0"+X,RND#2
    55: NEXT X: PRINT AT 0,h: INK 6:
    FLASH 1: "AT 0-1,h: INK 6:
    FLASH 1: "AT 0-1,h: "AT 0-1,h:
    CLS:
    FOR F=0 TO 21: PAUSE 5: PRINT AT
    F,0:"END OF MISSION" AT F-1,0:
    NEXT F: PRINT
    T 10,0:"Press any key for anothe
    r game": PAUSE 0: RUN

```

Lunar Lander
by G Dyer

Colour Mix

on BBC Micro

I have enclosed a utility program for either

model of the BBC computer which will allow the user to intermix any two colours from a range of eight available colours.

This will produce fairly reasonable colours you would expect if you mixed the colours as if they were paint.

But as many readers will know they can't be mixed as well, as they are not 'pure' colours. The produced colours will not be true, but I hope this short program will help readers to make their choice for colour mixes good ones.

```

10
20 REM " Colour Mix
30 A$=" Author: Mark Colson
40
50 MODE7
60 VDU23;8202;0;0;0;
70 VDU23,224,170,85,170,85,170,
    85,170,85
80 PROCIntro
90 MODE4
100 VDU23;8202;0;0;0;
110 VDU19,0,A-1;0;
120 VDU19,1,B-1;0;
130 FORA=1TO1240
140 VDU224
150 NEXT
160 A$=GET$
170 RUN
180
190 DEF PROCIntro
200 PRINTCHR#157
210 FORF=1TO2:PRINTCHR#157CHR#141
    CHR#129CHR#136TAB(14)"COLOUR
    MIX":NEXTF

```

```

220 PRINTCHR#157
230 PRINT "CHR#131CHR#157CHR#130
    TAB(6)A$ "CHR#156
240 PRINTCHR#157CHR#132"PICK TWO
    OF THESE COLOURS (BY NUMBER)"
250 PRINTCHR#157
260 DATABLACK,RED,GREEN,YELLOW,
    BLUE,MAGENTA,CYAN,WHITE
270 FORF=1TO8
280 READA$
290 PRINTCHR#157CHR#133TAB(5)F;".
    "A$
300 NEXTF
310 PRINTCHR#157
320 PRINTCHR#133CHR#157CHR#135TAB
    (4)"Press any key after to
    continue "CHR#156
330 A=VAL(GET$)
340 B=VAL(GET$)
350 ENDPROC

```

>RUN

Colour Mix
by Mark Colson

NEW SPECTRUM AND ZX81 SOFTWARE

"WINGED AVENGER"

Fast and furious. SPECTRUM version has SOUND and USER GRAPHICS. 7 LEVELS, 3 WAVES, MOTHER SHIP, HIGH SCORE, RE-FUELLING, RAPID FIRE, SMART BOMBS and LASER SHIELD. PCW "ONE OF THE BEST SINCLAIR GAMES YET" Only £4.50. All SPECTRUM - 16K ZX81.

"SPECTRUM SCRAMBLE"

MORE MCODE ACTION! "SO GOOD THE REVIEWERS DIDN'T REACH THE FINAL STAGE" (NOT BAD EITHER). NO LESS THAN 8 DIRECTIONAL KEYS for a SMOOTH MOVE. Full ARCADE features including: LASERS, BOMBS, INSTANT RESPONSE, CONTINUOUS SCORING, ROCKETS, SOUND, FUEL DUMPS, RED METEORS, DEFENDER CRAFT and HIGH SCORE. Beware CONDITION RED. With this one you MOVE, FIRE and BOMB AT THE SAME TIME. RELEASE PRICE OF £4.95. 16K or 48K SPECTRUM

"DO NOT PASS GO"

NOW THE 48K SPECTRUM VERSION IS READY

A COMPLETE SIMULATION of the BEST SELLING BOARD GAME, you know PARK LANE and all that. Up to SIX PLAYERS can compete with the MICRO doing all the WORK. Acts as DICE THROWER, BOARD, RENT COLLECTOR, UMPIRE, PARK RULE BOOK, ACCOUNTANT and PROPERTY RECORD. SUPER GRAPHICS by Gary Kennedy (thanks mate). GAME SAVE with winner so far report. COMPLETE with INSTRUCTION BOOKLET. The ULTIMATE in FAMILY GAMES. Don't MONOPOLISE YOUR MICRO. AMAZE all your friends and family. (Can you see your GRANNY on a MICRO?) ONLY £8.95. 16K ZX81 VERSION ALSO £8.95.

"BASE INVADERS"

The ONLY ARCADE GAME EVERYBODY SHOULD HAVE. The SCREENS the same. THE INVADERS are the same. BUT you get a SHIELD and a CHOICE of THREE SPEEDS. (O.K., FAST or INCREDIBLE). GOOD SOUND, a HARD GAME, and GREAT GRAPHICS. COMPLETE your software collection for just £4.50. 16K and 48K SPECTRUM only.

"AUDIO SONICS"

WINNER of WIZZ KID 82. For the SPECTRUM A.S. writes sound effects for your own programs. 26 PRE-SELECTED SOUND EFFECTS include TELEPHONE, POLICE SIREN, FROG, SPACE EFFECTS and OUTBOARD MOTOR. GO into MODIFY and you are presented with a display of SLIDER CONTROLS to adjust PITCH, RISE, FALL, BRISKNESS, DECCEL, ACCEL, TONE, REPEAT RATE, STUTTER and DELAY. ADJUST the SLIDERS then INSTANTLY hear the SOUND CREATED. Call "THE SOUND ONE" and a program file will appear that is ready for insertion into your own programs. Hours of EXPLORATION. YOU WILL BE AMAZED what BEEP can DO. We are proud to offer this at £4.99. 16K or 48K SPECTRUM

"SPECTRUM RENUMBER DELETE"

All MCODE RENUMBERS ALL NOT PART. "YOU WON'T BUY A BETTER RENUMBER PROGRAM FOR THE SPECTRUM" JUST 600 BYTES. At £4.95. ALSO ZX81 VERSION.

"HIGH NOON"

When YOU'VE SAVED THE GALAXY, SCRAMBLED or whatever else you do on your MICRO, what about a GUNFIGHT? Play the SPECTRUM or YOUR PAL'S THREE LEVELS. FULL FEATURES, CACTI, COFFINS, WAGONS, RAPID or SINGLE SHOTS, SUPERB GRAPHICS, GOOD SOUND including DEATH MARCH. ESCAPE! on TAPE for JUST £4.50

"DISPLAY"

Takes over when BIN and the DEMO tape left off. How would you like 273 different user defined GRAPHICS on a 16K SPECTRUM or a GRAND 336 for a 48K. All of these can be displayed on the screen at the SAME TIME. UDGs are stored as PAGES and any TWO PAGES may be exchanged in memory. FILES can be LOADED FROM or SAVED TO TAPE. LOAD into any page location. TURN a UDG 1/2 turn, 1/3 turn, FLIP a SHAPE over, REVERSE a SHAPE, EXPAND 1/2 of a CHARACTER into a full character. UP, DOWN, LEFT or RIGHT @ one PIXEL. 5 SHAPE FILES are included on TAPE, INCLUDING 64 CHARACTERS per LINE DISPLAY. COMPLETE with DEMO PROGRAM and INSTRUCTIONS. JUST RELEASED @ £7.00. 48K or 16K SPECTRUM only.

"YAHTZI"

Up to six players allowed. Plays the classic dice game of strategy. All-electric scorecard complete with Gary's "Chunky Look" character set. All cheating and errors rejected by your electronic umpire. Up-date your games cupboard for £5.50. 48K only.

"MATECALC"

For BUSINESS and PROFESSIONAL use. Ideal for WHAT IF situations. CASH FLOW FORECASTS and analysing RELATED figures. 64 character display option. FORMULA may be MATHEMATICAL or LOGICAL. MENU of FUNCTIONS. SAVE and LOAD DATA TO TAPE. FULL instructions included. LITERALLY HUNDREDS of USES. BOTH 48K and 16K SPECTRUM PROGRAMS on ONE TAPE. JUST £7.00. EXCELLENT VALUE

"PROGRAMMERS DREAM"

A SPECTRUM TOOLKIT. Position independent and just 1450 BYTES. Facilitates RENUMBER lines or blocks any increment or start. BLOCK OR LINE MOVE including a RENUMBER into place if required. BLOCK OR LINE ERASE. CHANGE SELECTED STRINGS (NAMES OR CONTENTS). DUMP variable names and values (usable in a loop). DISPLAY PROGRAM or PROGRAM plus VARIABLE SIZE. INSTANT and CLEAN. JUST £8.95 with explicit instructions.

SPECTRUM AND DRAGON PROGRAMS WANTED WORK FORCE

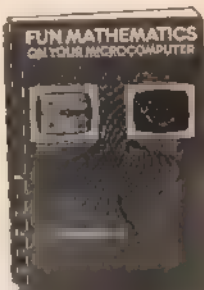
140 WILSDEN AVENUE, LUTON, BEDS, ENGLAND
ALSO AVAILABLE AT BUFFER, MICROWARE AND SOFTWARE SUPERMARKET.
REM WORK FORCE WORKS HARDER.

Fun Mathematics on Your Microcomputer

CZES KOSNIOWSKI

This entertaining, original book shows how to use a personal computer for recreational mathematics, providing an endless source of ideas for the personal computer user. Learn some fascinating mathematics, play some intriguing games and develop your computing skills. Find out about 'making snowflakes' and about 'confused but loving husbands', discover 'polar honey bees' and play Treasure Hunt. Each chapter introduces an important part of mathematics, explains the fundamental ideas and incorporates them into computer programs. All the programs are written in BASIC and are readily adaptable to individual computers.

£4.95 net



CAMBRIDGE UNIVERSITY PRESS

TO MAKE A SUPER GAME INTO A FANTASTIC GAME YOU NEED SOFTLINK 1.

This will allow you to use a Kempston type joystick with all the following Spectrum games:

Arcadia, Penetrator, Horace Goes Skiing, Spectres, Flight Simulation and Space Zombies.

ONLY £4.95

SPECIAL OFFER

Spectres plus Softlink 1 £11.00
Arcadia plus Softlink 1 £9.00

Also available: 3D Maze of Gold (with Kempston Joystick Option) £5.95

Two great adventures on one tape for your 16K Spectrum.

Time Line and Tasks £4.95

A superb adventure for your 48K Spectrum
Magic Castle £4.95

Arriving soon, by the author of Softlink 1, Tim Gilbert, the amazing new super game (with Kempston joystick option) for any Spectrum — Hidden City £5.95

See this game at the 7th ZX Microfair, Alexandra Palace, June 4

Cheques and postal orders to

BYTEWELL

203 COURT ROAD, BARRY,
SOUTH GLAMORGAN CF6 7EN
Tel: (0446) 742491



Parachute Attack

on Lynx

This is a game for the Lynx involving falling parachutes.

You are on a hillside and parachutes are

falling from the sky and into a boat.

You must shoot them before they get there. You are given six skill levels which determine how and how fast the parachutes fall.

Shoot with the space bar — you have 20 shots. The computer will beep when you

have hit a parachute.

Variables

T=Total points
E=Skill level and speed of parachute
A+B=Coordinates
QS=Points or Point
R = Parachutes that got away

```
100 REM *** PARACHUTE ATTACK ***
110 REM *** JOANNA GREENWOOD ***
120 LET R=0
130 LET T=0
140 LET M=0
150 LET X=100
160 LET U=190
170 LET P=0
180 LET N=0
190 CLS
200 INPUT "SKILL LEVEL (1 TO 6) " IE
210 IF E>6 THEN GOTO 200
220 LET E=E+1
230 RANDOM
240 PAPER 1
250 CLS
260 INK 4
270 FOR D=135 TO 230
280 LET U=U-1
290 PLOT 0,U,D
300 PLOT 2,255,D
310 NEXT D
320 INK 0
330 FOR B=120 TO 134
340 PLOT 0,212,B
350 PLOT 2,215,B
360 NEXT B
370 INK 0
380 FOR L=115 TO 119
390 PLOT 0,190,L
400 PLOT 2,220,L
410 NEXT L
420 INK 5
430 FOR J=231 TO 247
440 PLOT 0,0,J
450 PLOT 2,255,J
460 NEXT J
470 INK 0
480 FOR Y=215 TO 229
490 LET X=X-1
500 LET M=M+1
510 PLOT 0,M,Y
520 PLOT 2,X,Y
530 NEXT Y
540 LET S=5
550 LET A=Rand(90)*10
560 INK 7
570 PLOT 4,A,B
580 PLOT 0,A-2,B+1
590 PLOT 2,A+2,B+1
600 PLOT 0,A-4,B+2
610 PLOT 2,A+4,B+2
620 PLOT 0,A-5,B+3
630 PLOT 2,A+5,B+3
640 PLOT 0,A-5,B+4
650 PLOT 2,A+5,B+4
```

```
660 PLOT 0,A-4,B+5
670 PLOT 2,A,B+13
680 PLOT 0,A-4,B+5
690 PLOT 2,A,B+13
700 PLOT 0,A,B+5
710 PLOT 2,A,B+13
720 IF N=9 THEN GOTO 1020
730 IF INK=1 THEN GOTO 770
740 INK 1
750 IF KEY= " " THEN GOTO 820
760 GOTO 570
770 LET B=B+E
780 IF B>203 THEN LET R=R+1
790 IF B>203 THEN GOTO 540
800 IF KEY= " " THEN GOTO 820
810 GOTO 560
820 INK 0
830 PLOT 0,189,117
840 PLOT 2,A,117
850 IF INK=1 THEN GOTO 900
860 LET P=P+1
870 IF P>20 THEN GOTO 1040
880 IF INK 1
890 GOTO 830
900 IF D=4=117 THEN GOTO 950
910 IF B=5=117 THEN GOTO 950
920 IF B=6=117 THEN GOTO 950
930 IF B=7=117 THEN GOTO 950
940 GOTO 570
950 LET T=T+1
960 BEEP 50,100,65
970 INK 7
980 PAUSE 2500
990 LET N=N+1
1000 INK 1
1010 GOTO 570
1020 LET N=0
1030 GOTO 540
1040 CLS
1050 VDU 24
1060 IF T<1 THEN LET QS="9"
1070 ELSE LET QS=" "
1080 PRINT "YOU SCORED "T" POINTS"
1090 PRINT "USING 20 SHOTS"
1100 IF R=1 THEN LET QS="S"
1110 ELSE LET QS=" "
1120 PRINT R" PARACHUTE(S) GOT AWAY"
1130 VDU 25
1140 PRINT "3,001 WOULD YOU LIKE ANOTHER GO (Y/N)?"
1150 IF QS="Y" THEN GOTO 100
1160 END
```

Parachute Attack
by Joanna Greenwood

Early Bird

on Spectrum

You are a poor little bird who is stranded in Mr Green's garden with a broken wing. But be careful, a cat is on the prowl and out to devour you.

In the garden there is a puddle that slowly soaks away. You must avoid hopping into it or you will drown.

In order to recover you must catch 10 worms.

Full instructions are contained in the program.

Program notes

- 10-83 User defined graphics.
- 99-109 Initialise
- 200-299 Set up screen
- 300-329 Move bird and check position
- 325-350 Move cat and check position
- 360-380 Move worm and check position
- 800-887 Concluding comments
- 990-999 Instructions

```
100 SUB 990
110 FOR I=0 TO 99: REM: I = TIME
120 REM: I = 56,40,56,16,146,64,56,
130 DATA 56,40,56,16,146,64,56,
140 DATA 185,90,189,50,63,24,34
150 DATA 24,24,36,219,219,36,24
160 DATA 0,3,4,100,166,144,0,0
170 DATA 199,105,130,254,234,125
180 DATA 6,135,60,50,39,16,16,2
190 DATA 0,0,0,0,0,0,0,0
200 DATA 96,225,110,110,110,110
210 LET A=0: LET B=50:00 SUB
220
230 GO SUB 295: LET A=5: LET B=
240 LET X=10: LET Y=30
250 LET W=INT(RAND*10): LET W=
260 INT(RAND*10): IF W=1 THEN
```

```
260 LET W=10: LET W=10: LET W=10
270 LET W=10: LET W=10: LET W=10
280 LET W=10: LET W=10: LET W=10
290 LET W=10: LET W=10: LET W=10
300 LET W=10: LET W=10: LET W=10
310 LET W=10: LET W=10: LET W=10
320 LET W=10: LET W=10: LET W=10
330 LET W=10: LET W=10: LET W=10
340 LET W=10: LET W=10: LET W=10
350 LET W=10: LET W=10: LET W=10
360 LET W=10: LET W=10: LET W=10
370 LET W=10: LET W=10: LET W=10
380 LET W=10: LET W=10: LET W=10
390 LET W=10: LET W=10: LET W=10
400 LET W=10: LET W=10: LET W=10
410 LET W=10: LET W=10: LET W=10
420 LET W=10: LET W=10: LET W=10
430 LET W=10: LET W=10: LET W=10
440 LET W=10: LET W=10: LET W=10
450 LET W=10: LET W=10: LET W=10
460 LET W=10: LET W=10: LET W=10
470 LET W=10: LET W=10: LET W=10
480 LET W=10: LET W=10: LET W=10
490 LET W=10: LET W=10: LET W=10
500 LET W=10: LET W=10: LET W=10
510 LET W=10: LET W=10: LET W=10
520 LET W=10: LET W=10: LET W=10
530 LET W=10: LET W=10: LET W=10
540 LET W=10: LET W=10: LET W=10
550 LET W=10: LET W=10: LET W=10
560 LET W=10: LET W=10: LET W=10
570 LET W=10: LET W=10: LET W=10
580 LET W=10: LET W=10: LET W=10
590 LET W=10: LET W=10: LET W=10
600 LET W=10: LET W=10: LET W=10
610 LET W=10: LET W=10: LET W=10
620 LET W=10: LET W=10: LET W=10
630 LET W=10: LET W=10: LET W=10
640 LET W=10: LET W=10: LET W=10
650 LET W=10: LET W=10: LET W=10
660 LET W=10: LET W=10: LET W=10
670 LET W=10: LET W=10: LET W=10
680 LET W=10: LET W=10: LET W=10
690 LET W=10: LET W=10: LET W=10
700 LET W=10: LET W=10: LET W=10
710 LET W=10: LET W=10: LET W=10
720 LET W=10: LET W=10: LET W=10
730 LET W=10: LET W=10: LET W=10
740 LET W=10: LET W=10: LET W=10
750 LET W=10: LET W=10: LET W=10
760 LET W=10: LET W=10: LET W=10
770 LET W=10: LET W=10: LET W=10
780 LET W=10: LET W=10: LET W=10
790 LET W=10: LET W=10: LET W=10
800 LET W=10: LET W=10: LET W=10
810 LET W=10: LET W=10: LET W=10
820 LET W=10: LET W=10: LET W=10
830 LET W=10: LET W=10: LET W=10
840 LET W=10: LET W=10: LET W=10
850 LET W=10: LET W=10: LET W=10
860 LET W=10: LET W=10: LET W=10
870 LET W=10: LET W=10: LET W=10
880 LET W=10: LET W=10: LET W=10
890 LET W=10: LET W=10: LET W=10
900 LET W=10: LET W=10: LET W=10
910 LET W=10: LET W=10: LET W=10
920 LET W=10: LET W=10: LET W=10
930 LET W=10: LET W=10: LET W=10
940 LET W=10: LET W=10: LET W=10
950 LET W=10: LET W=10: LET W=10
960 LET W=10: LET W=10: LET W=10
970 LET W=10: LET W=10: LET W=10
980 LET W=10: LET W=10: LET W=10
990 LET W=10: LET W=10: LET W=10
```

Continued on page 39

PROGRAM OF THE WEEK

ASTROLOGY

truly AVAILABLE AT YOUR FINGERTIPS

USER PROMPTING PROGRAMS: merely key in birth information as requested by the computer — READ OUT (and/or PRINT OUT) what is normally the result of many hours of painstakingly tedious and complex mathematical calculations using tables, ephemeris, etc.

THE SIDEREAL TIME OF BIRTH.

THE ASCENDANT AND MIDHEAVEN in Sign, Degrees, Minutes and Seconds for EQUAL HOUSE SYSTEM.

THE SIGNS AND POSITIONS OF THE HOUSE CUSPS in Sign, Degrees, and Minutes for the PLACIDEAN SYSTEM.

THE SUN AND MOON POSITIONS in Sign, Degrees, Minutes and Seconds.

ALL THE PLANETS' POSITIONS in Sign, Degrees and Minutes.

THE LUNAR NODE — THE PART OF FORTUNE — THE VERTEX AND A HOST OF OTHER BIRTHCHART INFORMATION AT THE TOUCH OF A KEY.

ZX81 16K

ZODIAC I ONLY £10.00

ZODIAC II ONLY £8.00

GIVES YOU THE ASPECTS AND MIDPOINTS

FOR 48K SPECTRUM AND DRAGON 32

ZODIAC F

Full combined program on one cassette

FOR ONLY £15.00

Other programs in course of preparation include: PROGRESSING THE HOROSCOPE; RECTIFICATION OF THE BIRTH TIME, etc.

Send orders with cheque payable to:

STELLAR SERVICES

8 FIR TREE VALE, LEEDS LS17 7EY

Tel: (0532) 692770

GAMES CENTRE

THE LARGEST SELECTION OF GAMES IN THE WORLD

We stock the **BIG NAMES** in Computers including

ATARI 400/800
SINCLAIR ZX 81
ZX SPECTRUM

and a wide range of independent **SOFTWARE**

Main Computer Branches: 22 OXFORD STREET, London W.1.
439 OXFORD STREET, London W.1.
52 WESTERN ROAD, BRIGHTON.
31 LISTER GATE, NOTTINGHAM.
141 NEW STREET, BIRMINGHAM

Also at: 184 REGENT STREET, London W.1.
254 REGENT STREET, London W.1.

MACHINE CODE TEST TOOL
SPECTRUM AND ZX81

FULL SCREEN EDITOR / ASSEMBLER
SPECTRUM

MACHINE CODE MASTER TOOL KIT
SPECTRUM

ALL YOU NEED TO CRACK MACHINE CODE

For the Spectrum 16k & 48k

Test tools for Spectrum & ZX81/TS1000

The ultimate professional tutor and de-bug program.

We wrote this to help us write Machine Code!!

- Test and Display Machine Code instructions as they're written • Ideal for both the beginner and expert • Fully documented with 32 page tutorial • HEX: Decimal converter as standard • PLUS • Character Generator of unbelievable quality!

Full screen editor/assembler for Spectrum

The latest and most comprehensive Editor/Assembler yet produced.

- Full Screen 42 col. input/text editor • Assemble to screen/printer and/or tape • Assemble derivatives DEFW, DEFB, DEFW, DEFB, DEFL, ORG, EQU, END • Comprehensive syntax check • Binary, Octal, HEX & ASCII constants • Will even operate as a simple word processor • Fully documented instruction book • Plus Character Generator • plus, many, many more, all you've ever needed

Master tool kit for Spectrum

- Re-number facility • Delete copy and move block function • String search and substitute facility • Variable dump • Cross reference • Trace function • Real time clock and alarm system.

POST TO: OXFORD COMPUTER PUBLISHING LTD. P.O. BOX 99, OXFORD

Please send ☐ Machine Code Test Tool ZX81 ☐ Machine Code Test Tool Spectrum ☐ Editor Assembler ☐ Tool Kit

£9.95 each, any 2 or more £9.25 (Postage free UK only). Overseas add £1 per program.

Also available from most branches of Mr. H. Smith and other resellers. Also from Buffer Micro Streamline



ACCESS CARD NO.
EXPIRY DATE

NAME
ADDRESS

PCWK

TRANSFORM LTD

ZX Business Software. FOR SMALL BUSINESSES AND THE SELFEMPLOYED

BUSINESS BANK ACCOUNT: this program enables you to make debits under 11-15 subheadings. Statements include totals of all subheadings.
ZX81 £8.75

ZX SPECTRUM 48K £10.75

SALES DAY BOOK: for all your invoices this program will enable you to prepare statements ■ outstanding invoices. Program will also calculate VAT.
ZX81 £8.75

ZX SPECTRUM 48K £10.75

PURCHASE DAY BOOK: keeps a complete record ■ all your purchases under 11-15 subheadings. This program will also calculate and deduct VAT.
ZX81 £8.75

ZX SPECTRUM 48K £10.75

● All the programs have full search facilities ●

BUSINESS PACKS: including Bank Account, Sales, Purchase and Quarterly Analysis programs.
ZX81 £25.00

ZX SPECTRUM 48K £30.00

★ NEW ★

STOCK CONTROL: handles 900 lines, includes details ■ supplier. Program has full search facilities enabling you to search and update all lines from one supplier.

ZX SPECTRUM 48K £10.75

Please specify memory size when ordering for your ZX81 or ZX SPECTRUM

All prices include VAT post and packaging, for details send SAE ■

TRANSFORM LTD Dept. PCWK
41 Keats House, Porchester Mead Beckenham, Kent.
Tel: 01-658 1661.

MAXIMUM USE OF HIGH-RES
COLOUR GRAPHICS AND SOUND

DRAGON 32

DRONE "DATA TANK"

Drone is a 3D Graphic Simulation game which takes place inside your computer. You are equipped with an M.K. type Datatank, which can accelerate, brake, super-thrust, fire duel logic cannons and pulse laser through an optional on-screen sighting and target lock system.

Your mission as a free system warrior is ■ seek out and destroy the evil Rom Guardian. Search for him as you race through the countless memory tunnels and grid zones. Avoid the Error Bugs and Bit Attacks. Then defend yourself against the Guardians' Patrol Drones.

When you reach Roms Tower you must arm and accurately launch your Eroms but beware, hesitation may cause a malfunction, and mean instant de-resolution.

If you are not familiar with the operations ■ Datatank units you will be briefed by T.R.O.F.F., your on-board training robot officer who will talk you through the training mode before you transport into your chosen sector.

Complete with: Keyboard Overlay, Datatank Operation Manual, Machine Code presentation and Subroutines, T.R.O.F.F. The Talking Robot, Optional "End of Game" Printout.

All professionally packaged in an attractive "Book Type" case. Price £8.75 which includes postage and packing.

SEND TO CABLE SOFTWARE — ■ NEVILLE ROAD, LUTON, BEDS

Name.....

Address.....

I enclose a cheque/PO for £..... payable to Cable Software

Prentice-Hall

computer books month

June '83

New and best-selling computer books published by Prentice-Hall and its associated imprints—Brady, Reston, Reward and Spectrum—will be on display throughout the country in June.

FEATURING—

The ZX Spectrum—Your Personal Computer

Ian McLean, Simon Rushbrook Williams ■ Peter Williams

Written in an informal, friendly style, this practical guide to the ZX Spectrum is ideal for first-time users. Clear diagrams show you how to master the Spectrum's keyboard and press the correct keys for various functions. Storing information, making calculations, sound, and graphics are carefully explained, and there ■ a special section on making music on the Spectrum.

£6.95 240 pages 13-985028-7 May 26th '83

Also on display will be books on the BBC Micro, IBM PC, Commodore 64, ATARI, VIC, Z-80, 6502, CP/M, UNIX, Interfacing UCSD Pascal...

Visit Prentice-Hall computer books displays at

Austicks, Cookridge Street, Leeds
Blackwells, Broad Street, Oxford
Dillons, Malet Street, London
Foyles, Chancery Cross Road, London
Georges, Park Street, Bristol
Haigh & Hochland, Oxford Street, Manchester
Heffers, Trinity Street, Cambridge

John Smith, St Vincent Street, Glasgow
Modern Book Co., Praed Street, London
Smiths, London Street, Reading
Thom's, Percy Street, Newcastle
Willshaws, John Dalton Street, Manchester
and major branches of W. H. Smith
■ well as leading computer dealers.



Prentice/Hall International

66 Wood Lane End, Hemel Hempstead, Hertfordshire HP2 4RG, England.

OPEN FORUM

Prime Number

on Vic20

This program works on any Vic20 and many other machines with the minimum of adjustment.

The user types in a number above 1 and the computer will then proceed to work out all the prime numbers between 1 and your number. The results will be printed out on the screen unless the following adjustment

is made to print it out on the printer:

add 85 OPEN 1:4:CMD1
change 120 PRINT#1:CLOSE:END

Other machine users (ie. the Sinclair ate command will have to be inserted to 1) Open the printer command channel in line 85, and 2) Close the printer command channel in the line 120.

Other machine users (ie. the Sinclair ZX81 and Spectrum) will also have to delete the cursor commands in lines 60, 70 and 80.

Program notes

- Line
- 60 (Cursor command — Clear Screen) asks for the user to type in a number.
 - 70 (Cursor command — Cursor Down) demonstrates what the number shows.
 - 80 (Cursor command — Cursor Down) INPUTs the number and checks to see whether it is valid.
 - 90 PRINTs the first prime number (a 2) and starts the FOR-NEXT loop.
 - 100 Checks to see if the number is prime, and if it is, PRINTs it.
 - 110 Identifies that the number is not prime.
 - 120 Terminates the program.

```

10 REM*****
20 REM*
25 REM* PRIME NUMBER FIND *
30 REM*
40 REM* BY M.A. VALENTINE *
45 REM*
50 REM*****
60 PRINT"CLARIENTER LAST NUMBER TO BE CHECKED."
70 PRINT"COJ1.E. '1000' CHECKS FROM 2 TO 1000."
80 INPUT"COJ":N1:H=VAL(N1):IFN<20RNC>INT(N)THEN80
90 PRINT" 2":FORC=2TON
100 FORA=2TOSQR(C):IF(C/A)<>INT(C/A)THENNEXT:PRINT" C:;NEXT:GOTO120
110 A=SQR(C):NEXT:NEXT
120 END
    
```

Prime Number
by M Valentine

Adventure Competition

Write an adventure game and win a Commodore 64!

Popular Computing Weekly is offering a star prize of a Commodore 64 for the best adventure game written for any home micro — PLUS — a special prize of a Vic20 for the best essay on an adventure theme — PLUS — for the next 10 runners-up, two Commodore adventure games.

Each week during May, Popular Computing Weekly will publish a coupon — simply cut out any three and send them in with your entry.

The best adventure games are ideally a combination of action and logical riddles. For instance, to open a door the player should not merely have to find the magic word, but have to solve a puzzle in order to progress to the next location. Good graphics obviously enhance a program — and we'll be looking for a game that makes imaginative use of graphics, although that does not mean that a text-only program will be eliminated.

Other things we will be looking for are the surprise twists that make a program worth coming back to again and again.

And remember, don't make your game too difficult in the early stages — adventuring novices should have a chance to get some way into the game before getting stuck!

For those of you submitting scenarios with your program, think of it as a guide line for a programmer. Draw a map showing location objects and other important details of your

adventure, and compile a dictionary of key words that your program will accept!

If you do not want to write a full-blown adventure game, you can still enter the competition by writing an essay (up to 2,000 words) on an original adventure theme. A Vic20 will be awarded to the essay which describes the most original and interesting adventure game.

The competition will be judged by Tony Bridge and Popular Computing Weekly editor Brendon Gore.

PRIZES

1. Commodore 64
2. Vic20
3. Two Commodore adventure games of your choice for 10 runners-up

HOW TO ENTER

All you have to do to enter this competition is collect the coupons from three issues of this magazine and send them together with your entry (stating which machine your game is for) to:
Popular Computing Weekly
Adventure Competition
140 House Court
19 Whitcomb Street
London WC2E 7HF

RULES

1. Each entry must consist of your adventure, or essay together with three coupons, and your name and address.
2. Closing date for the Adventure Competition is 30 June 1983.
3. The judges' decision is final.
4. No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.

Adventure Competition

4

Name

Address

.....

.....

Tel No:

STARTECH



BLANK DATA CASSETTES

£5.95 inc VAT
Postage and Packing 45p

Computer Grade Data Cassettes suitable for use in all of today's home computers. Each comes with its own case.

Tick for further information:
☐ VIC 20 PRODUCTS
☐ COMMODORE 64
☐ Other (specify) _____

NAME _____
 ADDRESS _____
 POSTAL CODE _____

PLEASE SEND ME:
 Pack of 10 Data Cassettes
 Price _____
 TOTAL _____
 (inc VAT)

STAYLIST 208 Aigburth Rd, Aigburth, Liverpool L17 0SL 722-7267

DRAGON SOFTWARE all machine code

VULTURES — NEW (uses one joystick)

FAST MOVING GALAXIAN TYPE GAME in full colour with Hi Res graphics and sound. A flock of vultures guard their eggs. They swoop, terrorise you, try to kill them, but watch out. Just when you think you have killed them all the eggs hatch!

SUPPLIED ON CASSETTE **£6.95**

DGT2

THREE fast moving Arcade style games in full colour with Hi Res graphics and sound. Very addictive... any single one of these is worth a fiver, so £6.95 for a 3 is a bargain! (from PCW Review) SHARKS, LANDER and INVADERS. (No joystick)

3 ON ONE CASSETTE **£6.95**

EDITOR-ASSEMBLER - MONITOR

Two Pass Global type. Supports standard Motorola mnemonics and Addressing modes. Powerful Debug Monitor. Recommended for the serious user.

SUPPLIED ON CASSETTE WITH USER INFORMATION **£28.75**

DISASSEMBLER

Written in position independent Machine Code. Will run anywhere in RAM. The ideal tool to have around.

SOLD ON CASSETTE **£11.95**

SPECIAL OFFER

Buy Editor Assembler and Disassembler together and save £5.00.

Cost of both as one purchase **£35.00**

Cheques P.O.s payable to:

J. MORRISON (MICROS) LTD. (PCW2)

2 Glensdale Street, Leeds LS9 9JJ

ALL ORDERS DESPATCHED BY

RETURN FIRST CLASS POST

Callers and Trade enquiries welcome

Tel: (0532) 480967

BONKA

ADDICTIVE Arcade style game in full colour. Climb the ladders and dig holes to trap the Meeples before they kill you. 4 selectable speeds and choice of 110 & Meeples to start.

NO JOYSTICKS NEEDED

SUPPLIED ON CASSETTE **£7.95**

DGT4

THREE arcade style games with Hi Res graphics and sound. PTERODACTYL, TORPEDO RUN and HURNETS. NO JOYSTICKS NEEDED.

Excellent value for money.

3 ON ONE CASSETTE **£6.95**

CHESS

Hi Res display of board and pieces. 8 selectable levels of skill. CURSOR control move selection. (No numbers/letters to enter).

Supports CASTLING and EN PASSANT.

SUPPLIED ON CASSETTE **£7.95**



J. MORRISON (MICROS)

EXTEND SPECTRUM BASIC WITH

WHITE NOISE and GRAPHICS £5.95

A collection of Machine Code routines to add over 20 extra commands to Basic. These give total control over the screen via a window which can be scrolled (in eight directions), inverted, cleared, bordered and shaded (thus extending the normal range of colours). White Noise produces true explosions, gunshots and other sound effects, includes many other routines. Supplied with a comprehensive manual.

SUPER SOFTWARE PLUS KEEN PRICES MAKE OUR GAMES TAPES FOR YOUR SPECTRUM GREAT VALUE AT ONLY £4.95 EACH

1. **MONGOOSE and BEAR ISLAND** 16K or 48K
Fast and furious Arcade action
2. **REVERSI and POKER DICE** 16K or 48K
Games of skill and luck
3. **TIME-LINE and TASKS** 16K or 48K
Superb 16K Machine Code adventure and mind stimulating games
4. **MAGIC CASTLE** 48K only
Gripping adventure in Machine Code, rescue the Princess but beware of vampires and booby traps

SAE FOR FURTHER DETAILS
DEALER ENQUIRIES WELCOME

GILSOFT

30 HAWTHORN ROAD, BARRY
SOUTH GLAMORGAN, CF6 8LE
Tel: 0446 736369

Gilsoft are pleased to announce, that as a result of an agreement with Kempston Micro Electronics, our Softlink I Adaption Tape for the Kempston Joystick will in future be produced and marketed by Kempston's new software firm, Kempsoft. All prospective purchasers should now order this item from:

KEMPSTON, 180A BEDFORD ROAD, KEMPSTON, BEDFORD

Spectrum, Dragon, Vic20 and BBC owners

IVYSOFT

has built up a reputation with its Spectrum customers for a fast return of post service and a 10 percent discount on software.

We are now able to offer software for the Dragon, Vic20 and BBC micros on the same terms.

Phone or send large SAE for current price list stating which micro you own.

SPECTRUM OWNERS: Our latest additions include:

- | | |
|---------------------------|-------------------------------|
| Molar Maul £5.25 | Heathrow £7.55 |
| All Diddum £5.25 | Joust £5.65 |
| ETX £5.65 | Knights Quest £5.65 |
| Trader £9.50 | Frenzy £4.70 |
| Astroblaster £4.70 | Monsters in Hell £5.65 |

Ask for details of our software club: — for £3.00 annual membership you get 10 per cent discount on all software purchased, plus a monthly newsletter with even greater savings.

Centronics interface and printer cable for the Spectrum £44.00.

Star 510 printer, save £52.50 on RRP. Our price £349.00 including VAT.



IVYSOFT

91 Cleeve Drive, Ivybridge,
Devon Tel: 07554 4088



Meow Micros ZX81 16k

2 Super Games on each - £3.50 PER TAPE INC. P&P

Kludo For 2 to 8 players, this is a fast-paced, action-packed game of strategy and tactics.	Golf A 16-hole golf course with realistic graphics. Includes a putting aid and a hole-in-one bonus.	Road Race A fast-paced racing game with realistic graphics and sound effects.	Stormforce A fast-paced action game with realistic graphics and sound effects.
Battleships A fast-paced game of strategy and tactics.	Bar Billiards A fast-paced game of strategy and tactics.	Soccer A fast-paced game of strategy and tactics.	Starbuster A fast-paced game of strategy and tactics.

Send Cheque or Postal Order to: **£3.50 each or 2 for £6**
MEOW MICROS, 8 NEWNHAM CL, BRAINTREE, ESSEX

★ ★ LYNX SOFTWARE ★ ★

- TAPE 1**
THE MAZE GAME: Find your way out of a 3D Hi-resolution maze with five levels of play.
PACMAN: Eat the dots and avoid the ghost.
BREAKOUT: Knock down the wall with bat and ball.
- TAPE 2**
3D CHALLENGE: Find your way out of a maze built inside a cube with 40 levels of play.
DOODGEMS: Drive around the maze avoiding the block car controlled by the computer.
- TAPE 3**
DIGGER: Lay a pipeline from one side of the screen to the other.
BATTLESHIPS: Battle it out on a 10 x 10 grid against the computer.

Each tape is £5 including P&P from: **CLIVE CARTER, 110**
Liancayo Street, Sargoed, Mid Glamorgan CF8 8TP

POPULAR Computing WEEKLY Back Issues

Almost all the copies of PCW that you missed can still be bought as back issues for only 50p, including postage and packing.
 An index of the contents of the 35 issues published in 1982 is now available from the Publishers for only £1.20. It includes full details of all the programs, routines, reviews and news that you might have missed.

Please send me the following back issues at 50p each:

..... Total £.....

Please send me a copy of the 1982 PCW index at £1.20 ☐

I enclose a cheque/postal order for £.....

Name

Address

Please return to: Back Issues, PCW, Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF.

NEW LOW PRICES FOR 16/48K SPECTRUM SOFTWARE

- TAPE 1. SUPER DEFENDER 48K.** Fast action arcade game with excellent graphics, music, five levels of play and hall of fame.
COMPLETE WITH FRUIT MACHINE. Features include breaking the bank, "hold", real arcade sounds, brilliant graphics. Now only £3.00
- TAPE 2. 16K TEN GAMES 16K.** Tape 2 now has ten first class arcade games at a new low price. Includes: PacMan, Invaders, Frog, Asteroids, Pontoon, Lunar Lander, and more. Now only £4.50
- TAPE 3. 16K CHESS AND CONNECT 4.** Two games of strategy to challenge your wits against. Excellent use of graphics. A must. Now only £4.80
- TAPE 4. 16K ARITHMETIC QUIZ.** Two different types of quiz to teach small children how simple arithmetic can be. If you have small children, you must have this tape. Now only £4.00
- TAPE 5. 16/48K SAM SLOG.** You have been transformed into a slug, you have to set your way through the garden avoiding the slug pellets. Difficulty increases as you play.
- ONLY THE STRONG CAN SURVIVE THIS FANTASTIC NEW GAME.** Only £3.00
- PROGRAMMES WANTED, SEND TAPE WITH INSTRUCTIONS AND SAE**
SEND CHEQUES/POs TO
ANCO SOFTWARE, (DEPT PCW), 25 CORSEWALL STREET
COATBRIDGE ML5 1PX

Androids - the latest Spectrum game from Sunshine



Androids (Any ZX Spectrum)
 Trapped in an endless maze populated only by vicious androids your only objective — survival.
 You have a lazer of course and can withstand a few blows, but you'd better be quick on the draw, these guys are designed to kill. Maybe you can find an exit — but escape is impossible and your replenished resources won't last long.
 The fastest, most head-spinningly demanding game you'll ever play. **£5.95**

Please send me copies of **Androids** @ **£5.95 each**
 I enclose a cheque/postal order for £..... payable to
Sunshine Hobhouse Court 19 Whitcomb Street London WC2 7HF

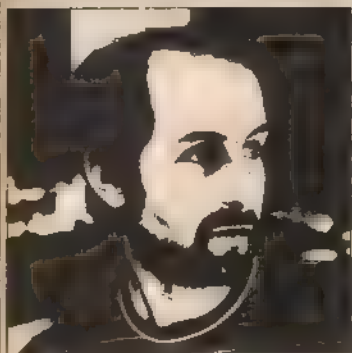
Name

Address

Signed

We can normally deliver in four or five days.

Tony Bridge's Adventure Corner



Rip-roaring fun

As the water imp slashes at your sword-arm, you nimbly avoid its thrust and in return aim a blow at its head — it staggers and you quickly follow up with another cut at its body. It falls dead ■ your feet. As you stagger away, a barrow wight appears and hurls a lightning bolt ■ you — luckily, it misses and you retaliate with a well-timed sleep spell which vanquishes the ethereal monster. You live to fight another day, warrior, with your stamina renewed and a few more experience points.

If all this is familiar to you, then you have probably played *Dungeons and Dragons*. The *Valley*, from Kayde Software, is a program for the expanded Spectrum, Vic20, Dragon, Newbrain and Oric, based on the combat system and monsters of that most popular Role Playing game. *Computing Today*, over a year ago, featured a program of the same name. Documented in great detail, it was written in Petsoft, with conversions available for the TSR and Sharp machines.

Generally, the program works well, although a black mark must be given to Kayde as the program does not *Auto-run* after *Loading*. This ■ a silly mistake nowadays — it's so easy to include the routine, and gives ■ much better impression to the player.

However, the rest of the program is much better. After selecting the skill level you want to play at (for some reason called "Speed Level" — there's no speeding involved in this game!), you are asked to choose a character. In true D&D fashion you may be wizard, cleric, thinker, warrior or barbarian — they all have their own effect on the later stages of the game, and you'll probably have your own favourite.

Then, the first map is drawn. A winding road, the "safe path", crosses a barren landscape which contains a few swamps and forests. At either end of the road is a castle, a refuge at which you may rest and rejuvenate and ■ which you must return treasures found along the way.

The article accompanying the original program went into the background of the scenario in great detail, with one of those high-flown gothic stories of magic and chivalry. Unfortunately, there is none of that here.

The general atmosphere, however, is medieval — you can tell that because of the language (there are lots of "thees" and "thous"), and the shape that represents you, a shield with white cross.

While on the safe path, no harm will befall you, as no creature will attack — but that's rather boring, and you certainly won't progress that way. Step off the path and you're fair game for any passing creature. The object is to move across the map picking up experience points along the way, as well as treasure, of course, like any self-respecting knight. Each swamp and forest contains temples or lodges, with several rooms, in some of which may be secreted the various gems and hoards of gold. These buildings are surrounded by lakes, inhabited, naturally, or rather unnaturally, by watery monsters.

The database for monster generation contains such lovely things as ringwraiths, harpies, minotaurs and wyverns, amongst many others. The monsters are of two sorts — natural or supernatural. You must make the appropriate reaction to each kind, by using one of three kinds of spells, or using your sword to hack at ■ specified part of the creature.

The ultimate aim of the adventure is to go from lowly Monsterhood (rating #1) through Necromancer and Paladin to Master of Destiny (rating #28). To get your rating, you must return to one of the castles with the various rings and helms

that you've picked up in your travels.

On the H-scale (where Melbourne House's *The Hobbit* ■ assumed to have an arbitrary score of 20), *The Valley* must rate about 17. A vital point is lost because of the lack of the presentation at the start and for having no *Auto-run*. Another point off for not having a *Save* routine. This is fairly serious, as the game will obviously take many hours to play.

However, the reason for losing the third point (the program is written in slow Basic) may actually help you. The lack of speed is regrettable, though you can live with it, but being written in a high-level language the program is easily adaptable. It should be fairly easy to write in your own *Save* character and program routine.

So, although the program shows its age, the adventure is nevertheless going to give you hours of non-cerebral, bash-about, rip-roaring fun!

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Cruising & Blind Alley

£10 to be won
Cruising

First there was *Space Invaders*, then there was *Pacman* — now there is *Cruising*. This all-action, machine code, arcade type game, will test your powers of co-ordination to the limit. Never before has a game asked you to think so quickly, or move so fast.

Achieving a high score on *Cruising* takes considerable skill, and not a little patience.

Popular Computing Weekly is offering £10 each month to the player with the highest score on *Cruising*. All you have to do to enter this month's competition is send a print-out of your highest score, together with your name and address, to:

Popular Computing Weekly
Cruising
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the *Cruising* challenge?

The highest score sent in so far this month is 9958 from Carl Doran of Skidby Mill, N. Humberstone. If you have a higher score, you could still win this month's £10 — but hurry, entries close on May 31.

Notes

- Each entry must consist of a ZX printout and your name and address.

Can you beat the new high score?
Blind Alley

- Closing date for this month's *Cruising* challenge entries is May 31.
- The highest score each month will receive £10.
- High scores cannot be transferred from one month to another.
- The judges' decision is final.
- No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.

Blind Alley

Blind Alley is a game of strategy. In order to win you must outwit the computer, using your craft to force in and finally destroy the enemy pursuit vehicles. But, watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley*. To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table, together with your name and address to:

Popular Computing Weekly
Blind Alley
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

The highest score sent in so far this month is 66485 from Neil Connor of Wallsend, Tyne & Wear. Entries for this month's competition close on May 31.

SALE P.&R. COMPUTER SHOP SALE

IBM GOLFBALL PRINTERS from £70 EACH + V.A.T.

INTERFACE FOR IBM GOLFBALL £40 + V.A.T.
"BRAND-NEW LA38 DEC WRITERS — SALE £200 EACH + V.A.T.

CENTRONIC 779 PRINTERS — £325 + V.A.T.
CENTRONIC 781 PRINTER — £350 + V.A.T.
POWER UNITS, 5-VOLT 6-AMP — £20 EACH
FANS, PCBs, KEYBOARDS AND LOTS MORE
8-INCH IBM FLOPPY DISC DRIVES

COME AND LOOK AROUND

SALCOTT MILL, GOLDHANGER ROAD
HEYBRIDGE, MALDON, ESSEX
PHONE MALDON (0621) 57440

DRAGON 32 SOFTWARE

EDITOR-ASSEMBLER-MONITOR
Assembler functions include ORG, FCBL, FDB, FCC, EQU, RMB and Hex or Decimal address subtraction. The ASSEMBLER is in the two pass Global type. Monitor contains useful routines enabling the user to write and run machine code programs. Supplied on cassette + user manual. £27

Q.B.T.1
Contains five super games: OTHELLO, BREAKOUT, AWARI, MOONLANDER and RAFFLES. Fascinating entertainment for all the family. Only £5.75.

D.G.F.A. MCODE
PTERODACTYL. Destroy all the eggs before they hatch. Beat off the attacking PTERODACTYLS.

TORPEDO RUN. Similar to the ARCADE version. 30 perspective ships further away give higher points.

HORNETS. Very fast game. Kill the HORNETS as they emerge, but beware when any they

Swarm from firing 'stings'. All three games only £11.85.

DISASSEMBLER
The ideal tool to have around. Disassemble the BASIC to see how it works. Make use of subroutines etc. Supplied on cassette. £11.85.

D.S.T.2
M-Code Games. **SHAKES**. Kill them before they kill you. Up to 12 giant snakes at one time.

LANDER. Land your craft on the Lunar surface. **INVADERS**. 35 invaders. Mother ship, 3 defenders. 9 star levels. 180 three games in 1M-RES. sound. £8.95.

CHESS M-Code. 8 Selectable levels of play. Hi-Resolution display of board and pieces. Durable control. Move selection. Specific places may be set up to solve chess problems.

Supplied on cassette + instructions. £7.95.

ALL ORDERS INCLUSIVE. SAME DAY DESPATCH. SEND S.A.E. FOR LIST.
J. MORRISON (MICROS) DEPT PCW, 2 GLENSDAL STREET, LEEDS LS9 9JJ
Callers welcome please phone (0532) 480887

ATTENTION ALL SPECTRUM USERS — BASIC TRACE —

A 760 byte machine code routine which intercepts each BASIC Statement prior to execution, displaying the line number, statement number, and the statement itself in the lower screen area.

FEATURES INCLUDE:-

- Single step or continuous program execution.
- Trace listings to ZX Printer if required.
- No corruption of upper screen display
- TRACE ON and OFF at will.
- 16K and 48K versions on same cassette.

● ALL THIS FOR ONLY £6.95 INCLUDING P & P FROM: ●

Texgate Computers Ltd.

Brook Lane, Corfe Mullen, Dorset BH21 3RD

BOND SYSTEMS

TOUCH TYPING with a new, simple finger position system gives "peek and peck" programmers new speed and accuracy. Your computer can type up to 100 words per minute with this course! Can you? DRAGON keyboard is ideal for this course. SPECTRUM has non-standard positions for space-bar and ":", but otherwise ideal.

VOCAB FRENCH and **VOCAB GERMAN** present a 700 word vocabulary of your most needed words straight into your "memory".

Write to BOND SYSTEMS, stating DRAGON or SPECTRUM and PROGRAM NAME, with £5.00 for each program.

15 BELMONT ROAD, HARROGATE,
NORTH YORKSHIRE, HG2 0LR

SYSTEM-SOFT

FOR THE BEST FROM THE REST

THE HOBBIT (MELBOURNE HOUSE) £14.95 SPECTRUM 48K	SPECTRES (BUG-BYTE) £8.00 SPECTRUM	VIC SCRAMBLE (BUG-BYTE) £7.00 VIC20	CHESS (DRAGON DATA) £21.50 DRAGON 32
THE CASTLE (BUG-BYTE) £8.00 ORIC SPECTRUM	VOLCANIC DUNGEON (CARNELL) £5.00 SPECTRUM 48K DRAGON 32	COWBOY SHOOTOUT (PROGRAM POWER) £4.95 SPECTRUM	JOYSTICKS (DRAGON DATA) £19.95 DRAGON 32

All prices fully inclusive. Free catalogue with every order!

Please send cheque/PO to: SYSTEM-SOFT,
FREEPOST, Ackworth, Pontefract, West Yorkshire WF7 7BR

ATTENTION ALL DRAGON OWNERS!

We proudly introduce

THE TREASURE CHEST SERIES

A collection of low price, high quality cassettes, each containing two programs on a particular theme. Themes to be covered include all aspects of adult and child education, games and utilities. One new release is promised every month.

All cassettes contain discount vouchers for future purchases.

INFANT PACK: Learn the alphabet and simple counting. 100% High-res Graphics with colours and music.

QUIZ PACK: (1) Crossword puzzle generator (with facility for creating your own). (2) Fast-moving word quiz against the clock — over 500 words in vocabulary.

ACTION PACK: (1) Travel through the complex maze, collecting Red Cross parcels, but avoiding the blue plague and deadly moving eyes. (2) Shoot down the spheres, but avoid the ever-advancing scorpion!

*** price £3.95 per cassette pack ***

Send cheque/PO to: SHARDS SOFTWARE, 10 Park Vale Court,
Vine Way, Brentwood, Essex CM14 4UR

PSSST!

HAVE YOU HEARD??

POKE YOUR PIXELS
IN THE POST
AND LET US
HAVE A PEEK

POKE YOUR PIXELS
IN THE POST
AND LET US
HAVE A PEEK

ENORMOUS
ROYALTIES PAID
FOR ORIGINAL
BUGGED GAMES

SEND YOUR CASSETTES
AND
DOCUMENTATION TO

INCORPORATED: SOUTHERN
PRODUCTS LIMITED
CINQUE PORTS STREET
RYE, SUSSEX
or TEL: 07974 2225

LEON NOEL

C10 COMPUTER TAPES

- ☐ Ten cassettes plus library boxes, self adhesive cassette labels and library box index inserts.

Only **£5.00**
Plus £1.00 for p&p

- ☐ 20 self adhesive cassette labels.

Only **75p**
Plus 20p for p&p

- ☐ 50 Library box index inserts.

Only **75p**
Plus 20p for p&p

Please make cheque/PO
payable to:

LEON-NOEL

11 DUDGEON DRIVE
LITTLEMORE
OXFORD OX4 4QL

Tel: OXFORD 711972

48K ZX SPECTRUM GAMES Simply the best Value Software . . .

VELNOR'S LAIR only £6.50 inc p&p

Can you find and destroy the evil wizard VELNOR and so prevent his reign of terror on Earth?

- ★ You can be a wizard, warrior or priest
- ★ Use spells such as polymorph, teleport, fireball, shield, heal and dispel undead
- ★ Collect treasure and items to help you in your quest
- ★ Encounter vampires, mummies, goblins, orcs, trolls and other creatures too ghastly to speak of
- ★ Score, save facility and full documentation

"Like a good book, you don't want to put it down . . . If you are a D&D person then this game is a must for your collection."

HOME COMPUTING WEEKLY, May 1983

TWO CLASSIC GAMES ON ONE TAPE FOR ONLY £5.50 inc p&p

MUNCH MAN

- ★ 4 ghosts and power pills
- ★ Real munching action in all 4 directions
- ★ Fruits for extra points
- ★ High score
- ★ Increasing difficulty from easy to impossible
- ★ Superb graphics
- ★ Hold game facility

STAR TREK

- ★ All the usual features plus:
- ★ Automatic short range scan
- ★ Galaxy chart
- ★ Anti-matter bombs
- ★ Klingon attacks on Starbases
- ★ Graphic Warp
- ★ Excellent use of graphics and sound
- ★ 9 levels of play

neptune

games from
another world

NEPTUNE COMPUTING (DEPT PCW 4)
96 Howe Street, Gateshead
Tyne and Wear, NE8 3PP

Tapes also available from: Last Chance, Leeds
Dragon Byte, Morley; The Computer Shop, Newcastle

TOWN NATHAN

Dragon Byte

Home Computers
Software and Games

51a Queen Street
Morley

Leeds
Tel: 0532 522890

ZX SPECTRUM
now under £100

Ring for more information

Last Chance

10 Ash Road
Headingley
Leeds 6
Tel: 744235

Home computers, software
board games, role-playing
games and books

At Last's place we make
you offers you can't refuse . . .

We're worth a visit because:

- ★ We've probably the best range of software in the North — and we're improving all the time.
- ★ We've a growing range of computers, peripherals, upgrades and books.
- ★ We've the biggest range of Citadel figures for leagues around.
- ★ We've board and adventure games for all ages from TSR, Games Workshop, Avalon Hill, Victory Games, GDW, Yaquinto, etc, etc.

PROGRAMMERS — Assassin Software needs
your marketable programs. Give us a call

C★TECH SOFTWARE

ROCKET RAIDER

Rocket Raider

The object of the game

You are piloting a spaceship through deep space when you are attacked by a force of mutant alien war. They retreat to a planet which you can see on your long range scanner. You decide to go down and investigate. You discover a planet scarred by four trenches, flying into them you find colonies of mutant invaders, fuel dumps, missile installations and drifting orbiting mines. Using your bombs and streams of laser torpedoes you must annihilate the enemy installations.

HOW AND WHERE TO GET C★Tech Software PRODUCTS

There are three ways to get the tape that you require. Firstly you can go to one of around 50 retailers in the UK and some more overseas, there is at least one in every town and several in major cities.

Secondly, you can ring our Telesales on 061-366 8223 and Alison or Shirley will take your order and if you of any other games you might be interested in. Last the most popular way is simply clip the coupon and send it to us at: C★Tech, 184 Market Street, HYDE, CHESHIRE, SK14 1EX.

PLEASE SEND ME THE FOLLOWING:

MY NAME AND ADDRESS IS:

Postcode
I ENCLOSE

16K/48K SPECTRUM
C★TECH
Computer Software

CLASSIFIED

Semi-display — £5 per single cc
Trade line — 20p per word
Private line — 10p per word

CALL DIANE DAVIS ON 01-839 2476 FOR SEMI-DISPLAY ADVERTISING

GAMES SOFTWARE



COMPUTER SOFTWARE
48K ORIC-1
HOPFROG—CITY BOMBER
with machine code for last-action graphics
Full colour and sound only £4.95

THE SORCERER (Q.P.)
very fast high-quality games with added
originals from COSMOS MISSION III, AP
PLES, TROW, LANDER — more only £4.95

Send cheque P.O. to:
COSMOS COMPUTER SOFTWARE
68 WOOD CRESCENT
NOTHERWELL, LANCASHIRE
NU 1HN

DRAGON HANDBOOK, over 100 words
with the option of entering your own, all
in Hi-res tape. Also includes maths
tests, £3.95 inc. inc. Jordan, 1 Orchard
College, Jeskyns Road, Cobham, Kent
DA12 3AL

CRICKET LOVERS, exciting limited-
over cricket game for Spectrum 48K
Only £4.95 + 55p p&p A. B. and S. G.
Harper, 37 Rossington Avenue, Bore-
hamwood, Herts WD8 4JX

SPECTRUM PROGRAMS
Escape By New Generation £4.95 (inc) 18K.
Can you find the exit, avoiding the monsters
and escape from the maze?
Spectravers — by Harewood.
£4.95 (inc) 18K.
Orion Mothering, Breda Zap, Zeele Baps.
nc) to mission Astroblast!
Spectrum Golf by R. A. R. £3.75 (inc) 18K.
One or two players, 19 or 18 hole course,
each course different. Mail orders.
Cheques/PDs or SAE for full list to
UT-AJ 15-A-R, 11 Margaret Avenue
St Austell, Cornwall
or visit AB - C Computers
Kynner Square, St Austell.

VIC20 UNEXPANDED SPACE GAME
cassette and chemistry quiz on
periodic table. Send £2 to: G. Thir-
away, 45 Salisbury Crescent, West
Comforth, Co. Durham DL17 9NT.

ACE SOFTWARE. Seven games for
the unexpanded Jupiter Ace, only £4.
Federation Software, 56 Rawley Cres-
cent, New Dutton, Northampton.

FOR THE VIC20 expanded to 6.5K
comes the Fountain of Saan. This
19.4K adventure loads in sequence,
making this possible. It makes use of
the Vic's sound, colour and graphics
facility. Send £4.50 plus 50p p&p to J.
McCleary, 31 Aitken Road, Hamilton
ML3 7YA.

VIC20 SOFTWARE

All the Imagine Software Cas-
settes including: Arcadia,
Whacky Waiters, Catcha
Snalcha. All for either the ex-
panded or unexpanded com-
puter at only £5.00 each!!
(inclusive of postage
and packing)

Send cheques/PDs to:
RULE COMPUTERS

30 TYLERS ACRE ROAD,
CORSTORPHINE,
EDINBURGH EH12 7HZ
(Tel: 031-334 7261)

T-99/4A SOFTWARE in extended
basic. Both programs utilise full colour
graphics and sound. £5 each HMS
Texas. You must depth charge cruising
submarines. Features include auto in-
cremental skill level, high score and
mystery subs. Ascot 99. A superb
simulation of a day at Ascot. P. Burmis-
ton, 19 Hereford Avenue, Ollerton,
Newark, Notts NG22 9AE

48K SPECTRUM DARTS. Five differ-
ent games, on board scoring with
options. Play computer or opponent(s)
R. Kerr, 83 Kevoakvale Park, Lass-
wade, Midlothian, Scotland

ZX81 16K MUNCHMAN. Superb
arcade reproduction. 8K machine-code
facility for use with micro-gen joystick,
four chasing ghosts, power pills, tun-
nels, increasing rate of play, high
score, extra life at 10,000, pause fac-
ility. £3.95. J. Gallagher, 16 Woodland
Close, Kingsbury, London NW9 8XP.

88C 'B' — TOP GAMES

SUPERGOLF.....£7.50
BUNFUN.....£6.50
OR ORDER BOTH.....£13
CHEQUES — PDS TO:

SQUIRREL SOFTWARE

DEPT (3) 4 BINDLOSS AVENUE
ECCLES, MANCHESTER M30 6DV

COMMODORE 64 Grand Prix cassette
High-speed racing game with
sound, oilsticks, machine code, three
screens, six skill levels, etc. Send £5 to
Nigel Latimer, 57 Bargate, Grimsby,
South Humberside.

YATZEE!! The popular dice game for
any Spectrum. Up to six players, £3.50
from M. Dolphin, 11 The Handbridge,
Highgate Park, Fulwood, Preston, Lan-
cashire

CHRISTINE COMPUTING

T99 4A SOFTWARE
NORTH SEA, CODE BREAK
ASTRO-FIGHTER

£3.50 each, £6.50 for two
£9 for all three

SAE for Hardware Software Catalogue
to:
Dept PCWK, 6 Florence Close, Walford,
Herts.

TWELVE 16K MACHINE CODE
GAMES for ZX81 includes Lunar Lan-
der, Dragon Slayer and others. Only
£3.50 includes postage. Also Dragon
File for Dragon 32, store up to 900
entries + save on tape facility. Only £3
includes postage. Send SAE for details
to: 16 The Fairway, Cox Green,
Maidenhead, Berkshire, SL6 3AR.

C.P. DATA SYSTEMS

DRAGON 32

"Enchanted Garden"

(padded cell extra) £4.95.

"Alien Attack" £2.95

Both games post FREE from:

4 MARSTON ROAD, THAME, OXON.

MINED-OUT. (Spectrum version). High
score = 5735. £3.50 BJA, 54 London
Street, Reading.

SPECTRUM 16/48K HX57487 games!
Ten in all. Send stamp to 19 Cumber-
land Avenue, Hornchurch, Essex for
list

JUPITER ACE SOFTWARE. High
quality games. Send SAE for details to:
1 Brookland Drive, Henley, Warks. Mid-
lands B95 5JA.

LYNX 48K SOFTWARE
Labyrinth — 30 Maze Game
Orbello — Our version of popular board game
in fast machine code
Chancellor — run the UK economy for 10
years
£4.75 each inc. p&p Cheques/P.O. to:
QUAZAR COMPUTING DEPT., PCW
17 TEG CLOSE, PORTSLADE, SUSSEX.

LYNX DEFEND, Dodgeball colour and
sound, fast action games cassette
£3.85 A. Miller, 50 Orchard Road,
Scor Green, Beaconsfield, Bucks.
ACORN SOFTWARE. Monsters,
Planetoid, Arcadians, Snapper, Rocket
Raid, Sphinx, Philosophers Quest,
Arcade Action, Super Invaders, Castle
of Riddles plus Bug-Byte Space Warp
and various others, £5.50 each. Tel:
Aiton 87401

EDUCATIONAL SOFTWARE

CRUISE, CRUISE. Here comes
Cruise. Cruise Missile trajectory simu-
lated with ZX81/Spectrum graphics.
Program printout free with following
publications for ZX81/Spectrum (1)
Satellite Spotter program prints posi-
tions of communication satellites lan-
ched by different countries. Graphic
displays (16K Ram). Price £6 + Hard
copy (2) Mathematical Programs with
graphics. Plots lines, circles, numerical
integration. Computes determinants,
maxima, series, mortgages. Price £8 +
Hard copy. Cash with order. Bliston,
24 Elm Close, Bedford, Beds MK41
8BZ.

BBC EDUCATIONAL PROGRAMS.
11 excellent programs, tried and tested
for 5-9 year olds, £5.95 David Jenkins,
11 Southview, Buntingford, Bedford.

CLASSIFIED ADVERTISING RATES:

Line by line: For private indi-
viduals, 10p per word, minimum
10 words.

**For companies, traders, and all
commercial bodies**, 20p per word,
minimum 20 words.

Semi-display: ■ per single col-
umn centimetre, minimum length
2 cm. (Please supply A/W as
PMT. Or supply rough setting
instructions.)

Conditions: All copy for Classi-
fied section must be pre-paid.
Cheques and postal orders should
arrive at least two weeks before
the publication date.

If you wish to discuss your ad,
please ring Diane Davis 01-
839 2476.

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

Please continue on a separate sheet of paper

I make this words, at per word so I owe you £

Name

Address

Telephone

Please cut out and send this form to: Classified Department, Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street, London WC2

DRAGON

USERS

Don't just play games, use your brains with our

EDUCATIONAL SOFTWARE

only £4.95 each

Arithmetic (10 levels) Biology (10 levels)
 Maths (10 levels) Spelling (999 yrs)
 Tables (711 yrs) Arithmetic (711 yrs)
 General Knowledge (999 yrs)

Fun to use, with full colour and sound

Only £4.95 each on cassette

Cheques/PO

MICRO-DE-BUG CONSULTANCY
 60 Sir John's Road, Selly Park
 Birmingham B29 7ER

PASS FRENCH "O" LEVEL. 50 verbs
 five senses for 48K Spectrum. Fun,
 random, selective testing or listing of verb
 in chosen tense. £3.95. W Thies. 25
 Pamela Drive, Norwich NR4 7LZ.

UTILITIES

THE ZX81 COPYKAT £1 only. Now
 you can stop and copy or examine any
 unstopable ZX81 programme. Works
 in any K, uses no memory. For short
 listing which takes one minute to enter.
 Send £1 only to Copykat, 15 Bannister
 Close, Greenford, Middlesex UB8
 0SW.

007 SPY. Lets you stop and copy any
 previously unstopable Spectrum cas-
 sette. On cassette, £2.95. Bobker, 29
 Chadderton Drive, Unsworth, Bury,
 Lancs

BROKEN JOYSTICK?

STRONGHOLD joystick insert

replacements supplied with

full fitting instructions. 3

YEAR GUARANTEE

£2.50 per inc p&p

SOFTWARE FOR ATARI

(TJH) 40000

All cassettes under £1

send s.a.c. for lists

Computer Supplies (HCW)

146 Church Road

Boston, Lincs PE21 0JX



ZX81 MACHINE CODE programming
 course (156 pages), will teach you how
 to program in machine code. Each
 instruction explained with examples.
 Send £7.95 to J Morton, 20 Stones
 Lane, High Green, Sheffield S30 4ES

DRAGON USERS. Disman new
 powerful disassembler monitor. Over
 20 commands. Gets right into the
 machine. Opens more doors. Car-
 lridge. Send £18.85. KayJay, 13 The
 Bouters, Gorleston, Great Yarmouth,
 for prompt delivery.

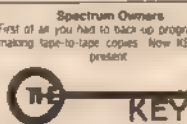
COMPUTER RATING METHODS

Put your computer to good use for pleasure
 or profit during the 1983 RAT and NH racing
 season with the most up-to-date and Profes-
 sional Computer Rating "METHOD" ever out
 on sale to the racing public, giving top-rated
 selections at good prices. Lasts a lifetime.
 Cassettes for ZX81 and Dragon 32 only.
 Printed for all computers using BASIC.

Send SAE for details to
 C.R.M., 14 Langdale Place
 Newton Aycliffe, Durham DL5 7DX

VIC EPROM PROGRAMMER. Pro-
 grams, reads, verifies, checks for
 blanks, 27/2516 — 2K, 27/2532 — 4K,
 2764 — 8K, complete plug-in unit +
 instructions and cassette software.
 Total price £35 inclusive PPJ Projects,
 31 Pilkington Road, Radcliffe, Man-
 chester M26 0PF. Tel: 061-724 9677.

TELETYPE ON YOUR SPECTRUM. ZX
 text lets you create your own personal
 teletext system. Similar to Ceefax and
 Oracle. Capacity 900 pages. Full col-
 our, graphics, flashing, inverse video,
 24-hour clock with alarm even the
 engineering test pages — it's all here!
 Cassette £495 complete with sample
 system. Full instructions and 12-month
 guarantee. Send cheque/PO (or SAE
 for details) to Ian Stewart, 17 Tony
 Drive, Alva, Scotland FK 12 5NQ



100% machine code! Copies any type of
 program. Order THE KEY for any ZX Spec-
 trum. Only £5.95

KEYSOFT, Oap! PCW's
 6 Bruce Grove, London N17 6RA

NE KEYSOFT advice does not infringe the

Copyright Acts

Dealer enquiries welcome

SPECTRUM "SMIFER", reads tapes
 and prints out program name, length in
 bytes and start address. Machine Code
 and Basic! Also gives auto run line
 number. £2.50 from AWA, 50 Dundo-
 nald Road, Didsbury, Manchester

SPECTRUM FLOWCHART produce
 accurate and decorative flowcharts of
 any Basic Spectrum program. Help
 plan programs, informative and educa-
 tional. Send only £1.70 to Sides, 4
 Willesden Road, Calfn-Glas, Bridgend,
 South Wales.

HARDWARE

VIC20 OWNERS

DON'T BE ROBBED

Make your Vic20 guard you and your property

while you are asleep

A 16 line Interface Kit, each line fully

programmable and independent of the other

15

Many other uses. Software examples

included with kit £19.95 inc VAT P&P

Charges etc. to Clonmelagh, 18

Clonmelagh Avenue, Kinnaird, Stockton, Co.

Clonmelagh

SPECTRUM VIDEO CONVERSION.

Modify your Spectrum to compare

video output for a better quality display

Send for detailed leaflet to Spectronics

Price £1.95. Cheques, postal orders

payable to J. Hewitt, Hall Cottage,

Church Hill, Monks Eleigh, Ipswich,

Suffolk.

SINCLAIR 16K Ram-pack Unused,

£15. Five rolls printer paper £9. (0734)

302478

ZX81 High Res Graphics Unit
 £32 (incl. VAT)

Tel: William Haynes 01-969 0619

Tools for Living

Notting Dale Technology Centre

191 Freston Road, London W10 6TH

Cheque/PO (add 15% VAT)

plus 75p p & p

15

COMMODORE 64

£264.00 (incl. VAT)

64 Programmers Ref Manual £15.95

+ £16.95 p&p

Tel: Chris Gurney, Dave Walsh or Floyd

Paterson

Tel: 01-969 4855 or send SAE

Image Science Micro Computers Ltd

105 Freston Rd, London W10 6TH

or cheques/PO (add 15% VAT) and £8

for p&p Securacur delivery

Postal Form 4820000 (a) for latest software

and hardware information and prices

INTELLIVISION. VGC with Tron 1,
 Tron II and seven more, sell for £200,
 swap for cased Fender Bass with
 accessories and good action. Write: V.
 Williams, 24 Hollis Park Avenue,
 Woodburn Green, High Wycombe,
 Bucks HP10 0BJ

CLUBS

GROSSWHITE ELECTRONICS Com-
 puter Club. New and used computers.
 ZX81, Vic20, ZX Spectrum, Commodore
 64, Lynx, Dragon 32, Juniper Ace,
 One 1, Atari 400/800, Acorn Atom,
 Colour Game. Tandy. Just about every
 type of machine and all its software
 and peripherals. Send SAE for list. All
 Visa and Access cards accepted. 109
 Morning Lane, Hackney, London E9.
 Tel: 01-985 6120 (day), 01-359 8277
 (evenings)

JUPITER ACE USERS CLUB

Newsletter, software (both
 games and utilities), adaptor
 for ZX81 add-ons.
 S.A.E. for details

Remsoft, 18 George Street
 Brighton BN2 1RH

ORIC-1 OWNERS. Tangerine created
 Oric-1 now TUG creates the rest. An
 independent users group with a solid
 reputation for progressive system sup-
 port. Monthly newsletters, meetings,
 software, hardware, reviews, advice
 and lots more. We have a proven
 record of performance on our system.

Join TUG. You'll like us, we do! Send
 £1.00 + S.A.E. (A4) for sample news-
 letter and details. Tangerine Users
 Group, 1 Marlborough Drive, Worle,
 Avon BS22 0DQ

CRS EXPRESS, BBC only. Reliable
 software exchange club. Send SAE for
 details. CRS Express, 7 Carlton Mews,
 Highbury, Lincoln LN4 1RB.

THE NATIONAL ASSOCIATION OF VIC20 OWNERS

- * SOFTWARE LIBRARY
- * MONTHLY NEWSLETTER
- * SOFTWARE EXCHANGE
- * ADVICE AND INFORMATION

SAE FOR DETAILS

THEN AVO

21 CHACELEY WAY,

SILVERDALE,

NOTTINGHAM

GROSSWHITE ELECTRONICS COM-
 PUTER CLUB, new and used compu-
 ters. ZX81, Vic20, ZX Spectrum, Com-
 modore 64, Lynx, Dragon 32, Juniper
 Ace, One 1, Atari 400/800, Acorn
 Atom, Colour Game. Tandy. Just about
 every type of machine and all its
 software and peripherals. Send SAE
 for list. All Visa and Access cards
 accepted. 109 Morning Lane, Hack-
 ney, London E9. Tel: 01-985 6120
 (day), 01-359 8277 (even)

SOFTWARE EXCHANGE. Swap your
 used software via our club. Free mem-
 bership. £1 per swap. Most computers
 included. S.A.E. for details. UKSEC, 15
 Turnwell Greave, Sheffield. S5 9GB.

EXCHANGE

DRAGON 32 EXCHANGE. Send 50p
 and any surplus Dragon 32 tape and
 receive another. 2 Jeffrey Lane, Brad-
 well, Sheffield.

DEALERS

RAWLINGS
 1001 ST JAMES ROAD
 SOUTHAMPTON SO9 5PJ
 Tel: (0703) 772700

400 Computer + 800 Computer +
 410 TP Rec + 410 TP Rec +
 + Basic/MML/S + Basic/MML/S +
 + Joystick + Joystick +
 + Cgame + Cgame +
 £240.00 inc. £75.00 inc.

EAST LONDON

WIDE RANGE OF SOFTWARE
 FOR SINCLAIR, VIC20,
 TRS 80 AND OTHER
 MACHINES

M. FOREMAN
 79 Mitcham road, London SE11 3LT
 Tel: 01-471 7040

COMPUTERS COMPUTERS COMPUTERS
 Send for our special prices on ORIC1 (new
 Rom), Vic20, Atari 400/800 and Commodore
 64. They are too good to miss! Plus numer-
 ous add-ons and peripherals and large
 selection of discount software for the above
 + ZX81, Spectrum and Dragon
 Why wait send now! For a catalogue
 3M SOFTWARE, FREEPOST (no stamp re-
 quired), Rotherham S66 0BR or Tel: (0709)
 03949 anytime with your requirements or
 for a catalogue.

ENFIELD COMMUNICATIONS

VIC20/64, ZX81, SPECTRUM
 BBC, DRAGON

GAMES EDUCATIONAL BUSINESS

Full range of software and accessories

NAPF 16/64K colour and sound £299 inc. VAT

Send SAE for full list

ENFIELD COMMUNICATIONS

135 HIGH STREET

PONDERS END, ENFIELD

MIDDLESEX, Tel: 805 7434

15

ORIC 1 48K — £137

Now in stock at Snobeech Micros

£137 + £4.25 P&P or

call in at SNOBEECH MICRO8

1 EAST GRINSTEAD ROAD

LINGFIELD, SURREY RH7 9EP

Tel: Lingfield 832478

Also One, BBC, Vic20, Dragon, Spec-

trum, ZX81 and Atari software. Blank

cassettes 39p each

See us on June 4 at the ZX Fair,

Alexandra Palace

Stand No. 08

COMMODORE 64 + VIC20 SOFTWARE AND HARDWARE FROM NOLANSO ELECTRONICS

Large selection of cassettes and car-
 tridges available, including Forth, Gro-
 runner, Educational programs, etc.

Phone Karen
 Digglewade (0767) 316702

MAGAZINES

DRAGON 32 or TANDY TRS-80 Colour? Lots
 of programs — lots of useful hints and
 information EVERY single month in "RAIN-
 BOW", an exciting new 200-page magazine
 from USA. Send £2.35 (plus large 37p s.e.c.)
 for sample issue to ELKAN ELECTRONICS
 (Dept. PCW), FREEPOST, 11 Bury New
 Road, Prestwich, Manchester M25 6LZ or
 telephone 061-790 7613 (24-hour service).

HOME MANAGEMENT

ZX SOFTWARE FOR SPECTRUM 16/48K
Persons: Rem-inder program - an excellent system for keeping track of birthdays, appointments, etc. Also Tel-Address program -- stores 40-100 records on 16/48K. Full user facilities include special search routine. Only £3.95 each or two for £5.95 including play computer cassette and instructions. Send cheque/PO (standing machine type) to: SD Micro-Systems, PO Box 24, Hachen Herts SG4 0AE.

BUSINESS SOFTWARE

SPECTRUM 48K

DIV Book-keeping

A complete book-keeping system based on best known book-keeping system for small businesses -- up to 300 invoices per month.

EASY TO USE

Purchase Ledger, Sales Ledger, Sales Journal (£24.95 each).

The manual with each tape is written for people who have never used a computer and know little or nothing about book-keeping.

3 Tapes (160)

ALL FOR UNDER £200

Lesson plans and notes available for teachers in FE and Secondary education. Further details: Ransop Software, 12 Millthorpe Road, Burslem, Warrington, Cheshire. For orders ring: St. Helens (0764) 59983.

NEWSRAN SOFTWARE. Business and serious application. Fully descriptive price list available on request. Comic-Micro, 18 Kneassworth Street, Roylton, Herts SG4 5AA.

RECRUITMENT

BEAUMONT SUMMER CAMPS. Who teach you computing to 16-18 year olds, one of many fine locations this summer? If you would like to, and know Commodore Basic, phone J. Hammond on 01-328 1079.

ACCESSORIES

DUST COVERS available for any computer, printer etc., BBC, TI, Epson, £3.95, Dragon, Atari, Vic20, £2.95. Sharp MZ80AK, £4.95. For others please phone or write to Sherborne Designs, Victory House, 8A The Bank, North Bradley, Trowbridge, Wiltshire. Tel: 02214 4425. Also made to measure service. Dealer enquiries welcome. Access and Barclaycard.

DISKS. Continuous labels etc. at discount prices. Call for lists Amersham (02403) 7540, Luton (0582) 412215.

NYLON DUST COVERS for micro and peripherals. Apple II/IIe, £4.95 (with two disk drives £5.95); Atari, Vic20, Dragon, £2.60, Epson MX80 printer, £3.95; Paper Tiger 445/60, £4.95; 12in monitor, £5.50 (state make). Enquiries/orders to CSM Enterprises, 10 Queensgate, Chorley, Lancashire PR7 2PX. Tel: Chorley 72703.

CASSETTE LABELS PRINTED. self-adhesive, any amount. See samples Six-Jays, Swanpool, Falmouth Cornwall.

COURSES

CALEDONIAN computer consultants provide programming consultancy and training courses in Basic, held regularly for beginners upwards. 292 Caledonian Road, London N1 1BA. Tel: 01-607 0157.

FOR HIRE

TO HIRE A COMPUTER from ZX81 upwards, ring or write to Business and Computer Services, 292 Caledonian Road, London N1 1BA. Tel: 01-607 0157.

BBC PRINTING

BBC PROGRAMME LISTING. Send your programme on cassette, I will return it by r.d. with your hardcopy, £1.60p + 60p additional copy D. Hattersley, 22 The Square, Cuthorpe, Chesterfield. Tel: 36935.

SOFTWARE

ZX81 16K M-RES PROGRAMS. No hardware required. SAE for details to Nick Godwin, 4 Hurkur Crescent, Eyemouth, Berwickshire, TD14 5AP. **ORIGINAL BBC TAPES** must go. Acornsoft Metacore £6. Interface Computer £26. Bug-Byte Polaris £4. Kanene Firebirds £6. P. Power Gomoku £2.80. Tel: Bourne End 23544.

HEBREW — עברית for 16/48K Spectrum

Complete Hebrew Input/Output system, allows input from any point on the screen. Fast display. Hebrew text with vowels (in m/c).

Only £7.50

HEBREW HANGMAN GAME

Only £5.75

MYB SOFTWARE (Dept P)

23a St Andrew's Road, London NW11 0PH.

● IMMEDIATE DELIVERY ●

COMPUNTA RACING FORECASTER

A tried and tested program. Simple to use — no records to update.

Tape contains data for flat races at any of 34 principal courses. High success rate. For Dragon 32, Spectrum 48K, Tandy COCO 32K, ZX81 16K.

Only £4.95 inclusive

RED ROM DATA 72 LAMBERT ROAD GRIMSBY DN32 0NR

★ LYNX MUSIC-MASTER ★

Now LYNX music is easy! For two-voice stave or screen, composer, copy, replay, change tempo, etc. Cassettes and full instructions £4.95.

ALBAOFT, 180 Terregles Avenue, Glasgow G41 4RR.

DRAGON INDEPENDENT OWNERS ASSOCIATION MATHS PROGRAMS

MATHS DERBY

Programmable Maths Race. Children of all capabilities can play an equal terms, kids can play too.

MATHS ADVENTURE

Aimed at 8-11 years, use their maths and tables to get into the secret castle and survive the Maths Monster.

PLUS BONUS PROGRAMS

DMA Members £3.95

Non members £4.95

Cheques/POs to 280A School House

Winter Gardens

Canvey Island

SAE for membership details

SPECTRUM dotty FROM UNIQUE

Players must test their imagination by guessing the identity of a dotty picture as quickly as they can. Pictures are chosen at random from a wide selection, and a picture poster is supplied, so the user can change pictures at will. Dot by Dot, all will be revealed. Staple machine and send cheques/POs for only £3.40 to:

UNIQUE COMPUTER SERVICES

Unit 6, 19 Ship Street, Macclesfield, Cheshire SK10 1US.

WANTED

TELETEXT ON YOUR SPECTRUM.

ZX text lets you create your own personal teletext system. Similar to Celesia and Oracle. Capacity 900 pages. Full colour, graphics, flashing, inverse video, 24-hour clock with alarm, even the engineering test pages — it's all here! Cassette £4.95 complete with sample system. Full instructions and 12-month guarantee. Send cheque/PO (or SAE for details) to: Ian Stewart, 17 Tony Drive, Alva, Scotland FK12 5NQ.

ZX80. original packing. Tel: Wheathampstead 3513.

WANTED

Original games programs for any micro. All games considered, machine code games especially welcome.

INSTANT CASH plus ROYALTIES

on all games accepted with a view to distribution in UK, USA, EUROPE.

VANTAGE SOFT

Tel: Birmingham (0244) 26167 or write PO Box 64, Birmingham, B15 2JL.

ORIC-1 48K and Seikosha Printer, connecting lead required. Purchased April. Technical service for changing micros. Accept £250 ono. Tel: Peters, Ayrshire 047-553 368.

COMMODORE PET 3032 (32K) computer, with ZX3040 disk drive. Tel: Mr Kolesch 01-7348907.

WANTED — PROGRAMS

Quality written games and business programs.

We pay up to £500 + royalties for all popular releases of machine.

If you have the ability to write imaginative and entertaining programs, we will offer you a financial package that is hard to beat. Write with details and sample if possible to:

COBASIC SOFTWARE

185 St Helier's Road

Wandsworth, E. Sussex, W13 2EH.

Tel: Wandsworth 448198

WE ARE currently looking for original preferably debugged games and utility programs. Anything from 16K to 24K is acceptable. If you have any programs that fit those criteria write to: Barnby Software, Liversburgh, Isle of Harris, PA83 3TX.

WANTED

USED AND BROKEN ZX81s

£10 paid for your non-working 1K ZX81 (£10 if you include PSU, manual and leads). £20 paid for working ZX81s. £10 paid for working 16K Rampacks. Send to: Telford Electronics, 28A Bradford Street, Shifnal, Shropshire. Tel: (Shifnal) 48068.

WANTED

SECONDHAND SOFTWARE AND HARDWARE ANYTHING FOR COMPUTERS INCLUDING GAMES. TOP PRICES PAID.

RING HEATH MICROWAVE ON 0691 652628.

SPECTRUM OWNER needs more software. If you have some to sell telephone Rainham (Essex) 22950 after 6.30 pm or weekends.

AUTHORS WANTED

If you can write programs, business, utilities, games for New Brain, Commodore 64, Epson HX-20, Atari 400/800, contact us for best prices.

Phoenix Publishing Association

14 Vernon Road, Bushey WD2 2JL. Telephone (0923) 32109.

We are seeking good quality, original, debugged games and utility programs for the ZX81 (1K-16K). We are offering an attractive remuneration package for the right program. Write to us at:

Dial Grove, 10a James Street, Covent Garden, London WC2.

You will be pleasantly surprised by our approach.

FOR SALE

40-TRACK 100K CUMANA disk drive. Never used, just bought, one year guarantee. 75 per cent of original price. Tel: 01-723 8833.

SPECTRUM 16/48K SOFTWARE. Exciting games of skill and logic on cassette. Wallball, Batball, Multi-Mastermind (49 versions), Archery, Stockmarket, £3.50 total. D. M. Roberts, 43 Aldwickbury Crescent, Harpenden, Herts.

ACORN ATOM 12K + 12K, books, cassettes, £100 ono for quick sale. Tel: 01-596 0092.

TRON4. Five months old plus cassette leads, adventure module, home budget management module, three Apex games + all original packaging (worth £220+), £140 ono. Tel: 274 8072 evenings.

ATARI 800, 16K cassette recorder, books. Four months old, £300. Tel: Wakefield 825970.

ATARI VCS six cartridges. Asteroids, Missile Command, Space Invaders, Adventure, Combat PacMan, joysticks and paddles included, £130. Tel: 0698 429031 after 6 pm.

ATARI COMPUTER CARTRIDGES. Chess, Space Invaders, Music Composer, Star Raiders, Jumbo Sea Pilot, Submarine Commander, All for £80 or will split. Tel: Leeds (0532) 531980.

ZX81 16K, DKTronics keyboard and graphics, Rom, over £200 software, two books, Abacus controller and all leads, £150. Tel: Winscombe 3145 after 4.30.

BARGAIN ATARI VSC - 7 cartridges including PacMan, Star Wars, cost £270, sell £120. Telephone 0742-368854

ACORN ATOM 12K Ram, 12K Ram, Sony cassette recorder and 12 good games programs, £110. Tel: 01-568 4254 after 5 pm.

ZX81 16K FILESIXTY KEYBOARD, £90. All software including Scramble, Asteroids, Mazogs, 3D Defender, adventure games etc. All for £90. Tel: 051-521 6109 evenings.

LYNX 48K, hardly used, unwanted gift, boxed etc, £180. Tel: Brighton (0273) 35909 after 11 pm.

VIC20 + COMMODORE 16K Ram pack + C2N cassette unit, still under guarantee. Bargain at £160 ono. Tel: Tamworth 288393 after 5 pm.

ATARI 400 16K + basic cartridge, £125, as new. Tel: (0202) 517342.

ZX81 + 16K RAM, Fully boxed including software, only £40. Tel: (0226) 382951

JUPITER ACE, Hardly used, £65 ono. Tel: Gravesend (0474) 61608

TRS80 L216K with CTR80, green screen, lower-case mod., sound monitor, RS232 interface + £200 software (including script), £350. Tel: Gravesend 332817 evenings.

VIC SOFTWARE SUPER EXPANDER, Vc graphics £25, three Bug-Byte rabbit tapes £10, Voodoo Castle £15, three-slot Motherboard + 8K £30, stack light pen £15, Rabbit Myriad plus Chisel 20, £10. Contact P. Boyd, 6 Whitefield Road, Holbury, Hants

CRED 75 TELEPRINTER (CASED), with mod/vdu/print unit, paper, etc. Very good condition, £50. Buyer collects. Tel: Stratford-on-Avon (0789) 69571.

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer.
Ring 01-930 3266 and give us the details.

Spectrums for sale

48K SPECTRUM with DK Tronics keyboard, with numeric pad and built-in light pen + brand new Kempston joystick and additional sound generator which can produce sounds that would make a BBC user jealous, £260. Tel: Ransham (Essex) 23341

48K SPECTRUM with ZX printer, £160. Tel: 0222 867086

48K SPECTRUM, 10 weeks old, £300 software, all top games, £160. Tel: 061-336 5954.

SPECTRUM 16K, mint condition. Lots of software including cassettes and magazines, £110. Tel: 01-870 2235.

16K SPECTRUM, Issue two + Horizons tape, two Space Invaders, £75. Tel: 01-337 0969

ZX81 16K + DK Tronics keyboard and £30 software, £85 ono. Tel: 0622 676810 after 4 pm.

16K SPECTRUM + software including Scramble and Avenger, £90. Tel: 01-304 5974.

16K SPECTRUM with lots of software, books, print and plotter, £130. Tel: Bedford 212645 after June 4.

16K SPECTRUM, Leaving country, £65 ono. Tel: 051-366 8223 (anytime).

ZX81s for sale

16K ZX81 with Redditch keyboard, £60 of software, magazines and two manuals. Asking £90 ono. Tel: 0292 89280, Ayr, Scotland.

ZX81 1K + software, manual, leads, four months' old. Upgrading to Spectrum, £35. Tel: Llanboidy (099 46) 211 after 4 pm.

ZX81, 16K, with Fuller keyboard, books and software, £100. Tel: 051-327 6629 after 6 pm.

16K RAM PACK for ZX81, £20. Brand new, under guarantee from April. Unused. Tel: Stubbington 662787

16K ZX81 with DK Tronics keyboard, printer, extra paper, AGS joystick converter + one joystick, high resolution graphics pack, £50 of software + magazines, £100 ono. Tel: 01-883 3653

ZX81 16K with Dean Electronics keyboard - OS sound board - motherboard - £50 of software + books, worth £180 sell for £90. Tel: 01-854 2967 after 6 pm.

ZX81 1K, excellent condition all leads power pack manuals, some software, £30 for quick sale. Tel: Mr Leete, 0753 74111 (office hours)

ZX81 16K with full size keyboard and lots of software £80. Tel: Croston 600263

16K ZX81 with Press keyboard + manuals and leads + four tapes and a few magazines £60. Tel: 499-4374 (after 5 pm)

ZX81 + 16K, Quicksilver soundboard, motherboard, DK Tronics graphics board. Can be sold separately, £90. Tel: Tunbridge Wells 39101

16K ZX81 with Redditch keyboard, Abacus controller, printer and books, games, £75. Tel: Reading 475826

ZX81 + 16K, still boxed + over £100 of software, £100 ono. Tel: Evesham 2487.

16K ZX81 with File 60 keyboard and beginner's book, £65. Tel: Crawley 863922.

ZX81 SINCLAIR 16K with manuals and leads etc, also £40 of software, £65. Tel: 0454-612465 (after 5 pm)

ZX81 + unused 16K + manual etc Pro. keyboard + £45 software, £60. Tel: Davo, Crewkerne (0450) 74667 after 5 pm.

ZX81 + 16K Ram, DK Tronics keyboard, all leads, manual and books, also a lot of software, £100 ono. Tel: Harlow 31079 after 7 pm

ZX81, 16K, machine code book three books, software Scramble 3D Defender, three adventures, magazines, £200. Yours for £130 ono. Tel: 01-995 6018 (after 5 pm)

ZX81 16K with soundbox, 15 tapes, all leads, etc. Good condition, £98. Tel: 397-6136

ZX81, 16K, three games tapes for £45. Tel: Newton-le-Willows (Merseyside) 21444.

ZX81, 16K, with all leads, lot of software, including Frogger, 3D Monster Maze and Scramble Tel: Leeds 652380 after 5 pm.

ZX81, 1K, with keyboard and software, £45 ono. Tel: 0241 52507

ZX81, 16K and Zox III soundpack + 70 tapes, 20 magazines + two books, £80 ono. Tel: (Crayford) 02154-859

ZX81, 16K, printer and paper, manual, books, worth £140, £100 ono. Tel: Dudley 236925 (after 6 pm).

ZX81, 1K + keyboard £35. Tel: 01-603 5644

Dragons for sale

DRAGON 32, 6 months old + cassette recorder, joysticks + software, £200. Tel: 0702 545575

DRAGON 32 with cassette recorder, 2 joysticks, parallel printer interface, cable, manuals, books, magazine articles + reviews, software, blank tapes, worth £300+, sell for £225. Tel: Coventry 618579

DRAGON 32, 6 months old, still in original box, £30 of games software. Tel: Stanford-le-Hope 642635

DRAGON 32 + joysticks, 22 games worth £420, in excellent condition, will sell for £235 or will sell software separately. Tel: Hull 52572

DRAGON 32, joystick, 22 tapes, 1 month old, value £420, yours for £235 ono, will separate. Mr Carr, Hull 507683.

DRAGON 32, joysticks, recorder, books, leads, 6 cassettes, Berserk cartridge, just over £300, sell for £200 ono. Tel: Chelmsford (0245) 62008.

DRAGON 32, mint condition + joysticks, £150 software + manuals/books, £210 ono. Tel: 0422 85009 after 4 pm.

DRAGON 32, 1 week old, pair of joysticks, 1 games cartridge, machine code book, £200 or exchange for BBC Model A. Tel: 0602 215810.

DRAGON 32, £100 of software, joysticks, books, worth £350, £250 ono. Tel: Stoke-on-Trent (0782) 413759 (6 pm).

DRAGON 32 + Tandy colour printer and extras, £280. Tel: 648 3924 (daytime)

DRAGON 32, 6 months old, complete with all leads, cassette recorder, instruction manual, books, joysticks, 7 games, £180. Tel: 0793 763960.

DRAGON 32, 6 months old + 2 joysticks, Berserk cartridge, 6 games (Donkey King, Phantom Slayer etc), 3 Tandy books, games book, magazines (Coconews) (3), Rainbow (3), Dragon User, all worth £300+. Could deliver, £220 ono. Tel: Leeds (0532) 622004

Tandys for sale

TRS 80 COLOUR COMPUTER, 32K VCR recorder, joysticks, cassette + cartridge software, learning lab, books etc, cost nearly £700, accept £350 ono. Tel: 061-370 2162.

TANDY CCP 115, colour graphics printer, plotter, with spare paper + pens, £120. Tel: Coventry 618579.

SWAP ADVENTURELAND for any other Vic adventure, except for Pirates Cove. Tel: 041-942 8146.

TANDY TRS 80, Model 1 Level 2, 16K, CPU + joystick + software, £125 ono. Tel: 0635 21419 after 4 pm.

Commodores for sale

COMMODORE VIC20 + C2N cassette unit + 4th language cartridge, £90 ono. Tel: Guildford 765252.

COMMODORE 64 with the latest model tape recorder (C2N) and reference guide manual and 11 games worth nearly £100. Total value about £520 guarantee - sell for £470 ono. Tel: 01-450 4858.

SPECIAL VIC20 8K internal memory + 8K expansion, high resolution Rom, machine code monitor, C2N tape, books, joysticks, software including Backgammon, Adventureland, £225 ono. Tel: 061-4313553

VIC20 - cassette unit, + super expander cartridge, programs and cartridge + adventure cartridge and cassette, software, £190. Tel: Egham 34643 after 6 pm.

VIC20 + cassette recorder, joystick, + software, swap for 48K Spectrum or £130. Tel: 0536 741651.

COMMODORE 64 with tape and software - manual and leads, £275 ono. Tel: 0625 828549

VIC20 - tape recorder - programmes + Programmers Reference Guide + 22 copies of Personal Computer World (in binders) in very good condition. Cost £260. Accept £180 or very near offer. Tel: 01-865 6321

VIC20 CARTRIDGES to sell, Jelly Monsters, Omega Race, Starblitz, Road Race, Radar Rat Race, £15 each. Adventures include all five Scott Adams V17 each. Also Vic20 software to exchange. Tel: 01-387 6751

COMMODORE 64 + C2N cassette recorder, complete with joysticks and software, £330 ono. Tel: Malvern 61602

VIC20, C2N cassette unit, etc, £135. Tel: 01-407 2667.

VIC20 with cassette deck, super expander, five cartridges, cassettes, joystick and books - for £250, worth £370 - call Tenby 2139 after 4.20.

VIC20 plus C2N cassette unit, 8K Ram, super-expander cartridge, books, manuals - for £150 - call 01-558 5631 after 6 pm.

COMMODORE 16K RP, £30. Tel: Leigh 675514.

EX-DEMONSTRATION MODEL VIC20 (under guarantee), plus C2N cassette deck. Also software + joystick, mint condition hardly used, £150. Tel: 01-841 3342.

VIC20, 16K RP + cassette recorder, £160. Tel: Tamworth 288393.

VIC20 plus C2N cassette, joystick, as new, £130. Tel: 0536 741651.

VIC20, cassette, three cartridges, software, joystick, Basic PI, excellent condition, worth £300 accept £175. Tel: 02993 5548.

COMMODORE 64, £280 ono. Only 2 months old. Tel: Tunbridge (0732) 361920.

VIC20 + 3 and 16K, Programmers Reference Guide, VIC Revealed, Sargon Chess, £155. Tel: (0732) 381920.

VIC20 8K Rampack, little used, £32 ono. Tel: 061 881 4391 (Manchester).

SPEECH SYNTHESIZER for the Commodore VIC20, swap for extra memory. Tel: 0772 25385.

VIC20 still under guarantee with cassette recorder and dust cover, + mega + games cassette, £170. Tel: 021 327 4986

COMMODORE PET 4032, 11 inch screen, tool kit, viscalc, lots of books, cover, 18 months, £370. Tel: 01-440 1553, 01-445 7771

VIC20, 21K cassette deck, joystick, books, 9 cartridges, including Jelly Monsters, Omega Race, Chess, 30 cassettes including Llamasoft, original software no pirate copies, cost new, over £800, £260 for quick sale. Tel: 0702-201637

VIC20 GAMES, Pirate Cove, Mission Impossible, Nutant, Herd and Avenger - cartridges, £15 each. Telephone for other games, including Quackers, Scramble, Blitz, Vicme, etc. all under £6 each. Tel: Sarnon 270081

VIC20 SUPER EXPANDER, £25. Tel: 01-808 8450.

COMMODORE 64 + C2N cassette player, University Lecturer, must sell, £350. Tel: Bracknell 20539

VIC20 + cassette, Adventures + Adventureland cartridge, Vicman, Amek, Asteroids, Vic Panic, over £60 other games + utilities, program reference guide, three metre video cable extension, all in good condition, £195 ono. Tel: Bolton (0204) 706892 (evenings)

VIC20, four months' old, swap for ZX Spectrum. Tel: Tenby 3042

VIC20, £50, Super Expander cartridge £20, C2N cassette deck £30, joystick £5, Omega Race £15. Tel: Crayford 56911 (after 6 pm)

VIC20 + tape recorder + 8K Ram + joystick + £90 software + Vic Innovative Computing + Vic Revealed, £150. Tel: Basildon 45166

VIC20, five months old, 16K memory + cassette recorder, £150. Tel: (Cardiff) 585784.

VIC20 + 3K + 16K + tape deck, Introduction to Basic 1 & 2, joystick, maths and English revision cassettes, £75. Tel: 0554 820561.

VIC20, 8K Ram, £25, 3K Ram, £15, Super Expander, £18, Vic Blockcount, £10. Introduction to Basics, Part 1, £8, Sargon II Chess cartridge, £18, The Court cartridge, £15. Other software available. Tel: (Huntingdon) 0480-72170.

VIC20 COMPUTER + C2N cassette recorder + 16K Ram, £100. Tel: Taunton 88728.

VIC20 + C2N cassette recorder, 4-slot motherboard, 16K Ram expansion, Super Expander, machine code monitor, joystick, Jellymonsters, lots of software including The Invasion, Starquest, Chess and many more, £300. Tel: (0522) 702644 (evening 5 pm).

VIC20 HI-RES, £18 ono. Tel: 01-579 2126 (after 6 pm).

COMMODORE VIC with tape unit, complete dust covers set, joystick, all manuals, Road Race Rom cartridge, much tape software, original Bugbyte Vicmen and Blitz. Excellent condition, £200 ono. Tel: Padgate 810490 (after 6 pm).

VIC20 C2N CASSETTE DECK, 16K memory, exp. joystick, two cartridges and software + magazines, £280 ono + five months' guarantee. Tel: 01-317 0999 (after 6 pm).

VIC20 plus C2N cassette deck (with one year sight months' guarantee), plus software and joystick. Sell for £150. Tel: 01-841 3342.

TAPE DECK + joystick for Vic20 + two games, Panic and Alien Blitz. All brand new, will accept £45. Tel: Hamilton 0698 428015.

VIC20 CASSETTE DECK, synthesiser tape + book and games, £150. Tel: 340-9611 (ask for Kevin).

VIC20 + C2N cassette drive and a Rom cartridge, £110. Tel: D. Heilner, Barry 744067.

VIC with cassette unit + 8K + 3-slot expander, Introduction to Basic Part 1, joystick, books, including Vic Revealed, software, £155. Tel: Bilerica 56854.

Ataris for sale

ATARI VCS with six cartridges, £85. Tel: 555 8317.

ATARI 400 48K cassette unit, disk drive, over 8000 of games, utilities on cassette + disc, £150 of reference books, £800 ono. Tel: Basingstoke (0256) 55464 (evening/weekends).

ATARI VCS + eight cartridges including Amidar, Spiderman, Empire Strikes Back, Demon Attack, Frogger. Worth £340, sell for £190 ono. Tel: 081 2267502 (after 4 pm).

ATARI 800 + 410 program recorder, joysticks, manuals including Dore Atari programs etc, five months old. Cost £530, sell £395. Tel: Eastbourne 641719.

ATARI VCS, seven months old, including PacMan, Space Invaders and Combat, £70. Tel: 02406 5945 (evening).

48K ATARI 800, with disc-drive, cassette and joysticks + various games. Value new £900, selling complete system + manuals for £550. Tel: Southend (0702) 814041.

DEMON ATTACK for Atari VCS to exchange for Parker Star Wars cartridge. Tel: 04862 70318.

ATARI VCS + five cartridges, £99.95 ono. Tel: Bookham 52289 (after 5 pm).

ATARI VCS + two cartridges, £80. Tel: Cobham (Surrey) 3503 (after 5 pm).

ATARI VCS + six cartridges will swap for Spectrum or Vic20 or sell for £125 ono. Tel: 025-671 3445 (after 4.00 pm).

ATARI VCS, as new, Space Invaders and Combat, Atari bullets, £75. Tel: Henfield 493694.

ATARI 400 + recorder, Basic cartridges, joystick, Centipede, Missile Command, Defender, Astron IV + manuals, four months old. Very good condition, £300 ono. Tel: 01-592 7048 (after 6 pm).

Acorns for sale

BBC MODEL B with joysticks and software, £300. Tel: Hunningdon (0480) 890803 (evening).

TRS 80, Level 2, 16K, green monitor, manual, numerous books/tapes, £250 ono. Tel: Leamington Spa 26506 (before 9 pm).

ACORNATOM, Acorn built 12K + 12K via software, £125. Tel: Cooper, 01-904 9210 (evening).

For sale

SWAP ATARI 800 + 410 recorder, joysticks, books + manuals including Dore Atari, program etc, 5 months, for BBC II. Tel: Eastbourne 641719 evenings.

BUY, SELL, part-exchange or swap a Commodore 64 game. And we sell games from price range of £2.50 to £8.95. Tel: 01-450 4858.

RETAILER SEEKS WIDER RANGE of software stock for Dragon Spectrum ZX81-Ons. Peasoft, 7 Hawthorn Crescent, Burton-on-Trent.

SHARP MZ 80K, with Pascal and Basic tapes, as new, £310. Tel: 0926 59658.

LOTS OF VIC20 software. Tel: Peter 577 2476.

SWAP VIC20 Gunt Adventure cartridge for Mission Impossible Johnstones (Renfrewshire) 21586.

MICROTAN 85 6K Ram, Basic Rom, tool kit Rom, full keyboard, system rack, lots of games, programs + word processor, £370. Tel: Hollington (08926) 221 (Stalls). Also Epson MX80 FT1, with connecting leads for Microtan, excellent condition, £270.

SWAP SPECTRUM GAMES, lots of all varieties, including The Hobbit, Cruising, Slippery Sid, Pimania and loads of others. Also a ZX81 with 16K joysticks, graphic Rom for £100 + lots of software. Tel: Penn 5738.

£50 worth of ZX81 software for sale, including 3D Defender, Scramble, Magogs, etc. Ring for details. Tel: 0480 74867.

TEXAS T199/4A cassette leads, joystick, TI Invaders, 6-months-old, £160, or split. Tel: 061-226 1335.

16K RAM pack for ZX81 for £18, offers welcome. Tel: 01-722 7425, after 6 pm.

ELFTONE tape recorder with 3-pin socket + counter, suitable for Oric I, £29. Tel: 445 5989.

EXCHANGE your software with me. Send an a/s to M. A. Valentine, 101A Underdale Road, Monkmoor, Shrewsbury, Shropshire SY2 5EF.

SHARP MZ 80K 48K Ram, RITTY Interface, fitted transmitter and receiver software, Morse code decoder software, nights machine code, software, also other software books + magazines. Asking £320 ono. Tel: Atherton 891140.

ORIGINAL SPECTRUM software for sale, Escape £3.50, Maze Man £3.50, Night Flight £4.50, Spectral Invader £3.50, Time Gate £5.50, Drafts £5.50. Write to: 39 Framfield Road, Uckfield, East Sussex TN22 6AH or Tel: 0825 2514 (Saturday between 12 am and 2 pm).

ATARI VHS tapes, Pacman £20, Defender £20, Basketball £10, Skiing £10, Demon Attack £15, Space Invaders £15. Please ring 958 6181.

INTELLIVISION + Soccer, Basketball, Horse Racing, Space Battle and Tennis cartridges, excellent condition, £150. Tel: Kings Lynn 62234 (evening).

DAI 48K improved keyboard, user mags, £560 ono. Tel: 01-670 5909.

T199/4A, 7 months old + cassette recorder + leads, £110 ono. Tel: 04855 2887.

VIC SUPER EXPANDER cartridge, £25. Tel: 808 6450.

BINTONE COLOUR TV GAME + Subotable soccer + MS Logic 5, for a 1K or 16K ZX81 with leads. Tel: Neil 051-508 6126 evenings.

SWAP OR SELL VIC20 GAMES. Tel: 01-579 2129 also cartridges.

PHILIPS G7000 with three cartridges, little used, in mint condition, cost £111, will sell for £60. Tel: Lytham 733077.

LINX COMPUTER, six weeks old, unwanted gift, £220. Tel: Doncaster 856528.

SPECTRUM 48K plus cassette recorder, 3 months old, £180. Tel: Crawley 512606 (after 6 pm).

SWAP, Apple II Euro + for any software. Tel: Harrow 9527378.

20 INCH, b/w television, excellent picture, perfect working order, £15. Tel: 051-3395894 (after 4 pm).

SWAP, Vic cartridge, Adventure Land for Count or Voodoo Castle. Tel: 05432 22482.

CBM, 16K Ram, Avenger, Sargon II, Chess, 3 Stick Intro to Basic I and II, Innovative computing book, new £160, £100 ono. Tel: 074488 2325 (after 6 pm).

RD Digital tracer, mounted on a board, £40. Tel: 0274-727985.

SWAP Spectrum Football Manager for Pimania or Black Crystal Adventure. Tel: 0632-673203 (after 5 pm).

VIC 4TH cartridge, swap for Super Expander or switchable Ram or 2 games cartridges. Tel: Norwich 0603409534.

SWAP, 48K Spectrum for 16K ZX81 plus £20. Tel: 01-460 4603.

VIDEO MASTER, Star Chess, £75. Tel: 01-304 1819 (after 4.30 pm).

FURTHER PROGRAMMING for ZX Spectrum (Shiva), £4.50 + Cartridge Colour Collection (book + tape), £6. Tel: 01-348 0966.

MISSION IMPOSSIBLE for Vic 20, £15. Donkey Kemp, Wexley Walkers, £10. Tel: 01-500 9558.

VIC 20, software to swap. Tel: 01-205 9649.

WARRIOR + Star Trek for 16K ZX81 (Marconi Software), £2 each. Tel: 0906-568216.

CARTRIDGES including Demon Attack, Sub Hunt, Tron, 14 in all (Mafel Television), from £10 each. Tel: 041-882 8788.

TI 99/4A, unwanted Christmas present, includes speech synthesiser, speech editor module, TI Invaders module, Munchman module, joysticks, dual cassette cable, audio, cassettes and magazines. All for £250. Tel: Doncaster 0302-723571.

MZ 80A, as new + software, books, etc., £395 or exchange system, 01-908 1460.

ADULT DRAGON owner wishes to exchange tapes and cartridges, Eponas, large and varied selection from the serious and Teletext through to games and learning, tape/cartridge. Tel: Staines 58707 (after 6 pm).

OVER £100 SOFTWARE, will sell for £70, or will swap for other originals. Tel: Chester (0244) 378549.

SPECTRUM software, swap or sell. Tel: Chester 376682.

VIC 20, Mission Impossible, Type-A-Tune + Cosmos, swap for the Vic m/c monitor cartridge. Tel: East Kilbride 42853.

48K LINX, 2 weeks old, 1 year guarantee, all leads, PSU, books, manuals + software, all in perfect condition, £220 no offers, will swap for BBC model A. Tel: Waltham Cross 28173.

VIC 20 cartridges for sale, includes Gorf, Chess, £15 each, also Star Battle, Road Race + many, many more, £12 each. Tel: 01-574 4122.

VIC20 CARTRIDGES: Jelly Monsters, Omega Race, Road Race, Star Battle, Rat Race and Meteor Run -- £14 each. Scott Adam's Five Adventures for £17 each. Rabbit New 6 including Orbs Linkwell, £10. Call 01-357 8751.

SUPER STAR multi-mode CB transfer, exchange for printer compatible for BBC. Tel: Mr Guthrie, Enith 33474.

ARTHON EXPANSION UNIT, for Vic20, £65 ono. Tel: 01-650 9701.

5 SPECTRUM BOOKS, inc. Spectrum Handbook, £20. Tel: 0555-71502.

VIC20 CASSETTE, Pirate Code swap for Voodoo Castle or Count Dracula. Tel: Atherton 895119.

SWAP, Arlon 8K expansion pack + many 8K games for your Commodore 8K pack. Tel: Stevenage 811634 (after 7.30 pm).

SHARP 1780K, 48K, Ram, manuals, games, tapes, etc, £250. Tel: Peterborough 204255.

SWAP, Alan 800 + 410 program recorder, joysticks, manuals in Dore Atari programs etc, 5 months old, for similarly equipped BBC computer. Eastbourne 641719.

HOMING PIGEONS + Bowling for the 16K ZX81, exciting programs written in Basic. For both games on one tape send a cheque to the value of £2 to C. Hume, 38 Long Craigs Terrace, Kinghorn, Fife KY3 8TD.

64K TUSCON SYSTEM Z80A, working at 4 mgs, CPM disc system with 190K formatted, including CPM £100, cost £1,550, sell for £1,000 or swap for something useful. Tel: 466 6246.

ATARI SOFTWARE for Atari 400/600, 3 cartridges, Star Raiders, Missile Command, Asteroids, the three £56. Protector (cassette), £12. Tel: 0702 201637.

140 COMPUTER MAGAZINES, all popular titles, sell for £13 or swap Dragon Forth. Tel: Ware (0820) 68264.

INTEL SYSTEM development kit for 80/85, any offers. Tel: Layer 342 after 7 pm.

SHARP MZ, 80K, personal computer, 48K model, immaculate condition, hardly used, as new, cost £400, selling for only £350 ono, also includes dust cover, green screen and many programs. Tel: 061-773 3445.

Wanted

WANTED, BBC MICRO COMPUTER, Model A or B, must be in good condition. Tel: Havant 473069.

VIC20, swap Omega race for any adventure cartridge. Tel: Stevenage 0438 4086.

WANTED, BBC MODEL B, plus cassette and manuals etc, pay up to £320. Tel: Worthing 0903 6793.

WANTED, FELLOW SPECTRUM OWNER, living in or around Harpenden for exchanging software and ideas. Tel: Harpenden 69152 (after 11 pm).

I WANT A BBC MODEL B, instant cash paid. Tel: Harpenden 69152 (after 6 pm) with full details of your Beab.

WANTED, BBC MODEL B with or without accessories and software. Tel: 01-741 1745.

WANTED, Cassette Recorder, Jack, Din Plugs, Counter. Tel: Chester (0244) 378548 (6-8 pm).

WANTED, BBC 32K A or B Micro-computer. Must be in good condition. Tel: Coventry (0203) 504485 (after 5 pm).

SWAP VIC20 Asteroids for other Vic20 games. Tel: 0341 280726 (after 6 pm).

WANTED, BBC MODEL B and software, offer exchange of Yamaha 250cc, 1981, US Custom motorcycle, 1,000 miles only, immaculate. Tel: 0443 871227.

NEW RELEASES

TEERING-OFF!

Vic Golf uses defined graphics and split screen techniques to enable you to play the game on your micro.

The game requires 3K extra memory and a joystick. Those who have brought material from the manufacturers of the tape — CP White — should note the new address given below.

Program *Vic Golf*
Price £4.00
Micro Vic20 (+3K and Joystick)
Supplier CP White (Services)
52 Northfield Ave
West Ealing
London W13 9SY

KRAZY KONG



Krazy Kong is a ZX81 version of the popular arcade game of the same title.

The game features a pyramid you must climb, whilst knocking out the supports for *Krazy Kong* as you go. You reach him by climbing various ladders — and avoiding the rocks and barrels which are thrown at you.

The game has three screens and, it is claimed, all the features of the original.

Program *Krazy Kong*
Price £3.95
Micro ZX81 16K
Supplier Personal Software Services
452 Stoney Stanton Rd
Coventry CV6 5DG

INTO GEAR

Although lagging behind the seemingly endless range of books produced for the Spec-

trum, the *Dragon* book market is gradually getting into gear.

The *Power of the Dragon* is a new book from Microsource which uses 30 programs to illustrate different programming techniques. Each program has a line by line commentary, explaining how the program works.

Book *The Power of the Dragon*
Price £5.95
Micro *Dragon 32*
Supplier Microsource
1 Branch Road
Park Street
St Albans
(+50p P+P)

PROCESSED

Although *Telewriter* looks like becoming the flagship word-processor for the *Dragon*, its price (over £40) may lead people to look elsewhere.

Textstar is a *Dragon* word-processor which offers most of the usual wordprocessor functions like line insertion, find and display string, etc.

Total file length is up to six pages of A4 text. It is one of a developing range of *Dragon* programs from Personal Software Services.

Program *Textstar*
Price £12.95
Micro *Dragon 32*
Supplier Personal Software Services
452 Stoney Stanton Rd
Coventry
CV6 5DG

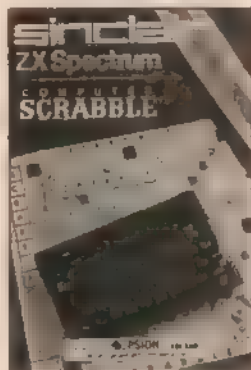
PACKAGE DEAL

Ramtop is a company offering a complete package for the small business.

The package consists of three cassettes for the 48K Spectrum — a sales journal, a sales ledger and a purchase ledger. The three cassettes come with an explanatory booklet and incorporate routines which enable them to be used with a ZX printer.

Program *DIY Book Keeping*
Price £24.95 per tape
Micro *Spectrum 48K*
Supplier Ramtop Software
12 Milnthorpe Rd
Burtonwood
Warrington
Cheshire

WORD GAMES!



Few single programs have had better advance TV coverage than *Scrabble* from Psion.

For some reason this computer version of the popular board game has grabbed the media's attention — perhaps because the idea of a computer playing around with words has overtones of artificial intelligence.

The cassette comes in a box with an explanatory booklet. The rules of *Scrabble* are outlined, as is the use of the computer. One of the many options included in the game is a chance to see the computer thinking about its next move — this involves letters whizzing about as it searches through all the possible permutations.

It is perhaps not surprising that such a likely best-seller comes at a luxury price — £15.95 — but then I suppose someone has got to be paid for typing in the dictionary of words the computer understands — there are over 11,000 of them.

Program *Scrabble*
Price £15.95
Micro *Spectrum 48K*
Supplier Psion
2 Huntsworth Mews
Gloucester Place
London NW1 6DD

SPIDER'S WEB!

Horace and the Spiders is the latest edition to the *Hungry Horace* series.

The plot sounds like a mixture of half a dozen arcade games put together. Firstly,

Horace has to climb the hills to the Spider mountains, jumping over the spiders that run at him. Then, he must negotiate the spider bridge, by using dangling threads as ropes, until finally he reaches the spider cave.

Once in the cave, *Horace* can attack the spiders and make holes in their web. *Horace* has four phials of serum which will protect him from spider bites.

Psion is now describing this game as an adventure and it certainly has a complicated plot.

What next I wonder — a 48K special *Horace* enters *Mastermind* perhaps?

Program *Horace and the Spiders*
Price £5.95
Micro *Spectrum 16/48K*
Supplier Psion Melbourne House
2 Huntsworth Mews
Gloucester Place
London NW1 6DD

SINGING PI!



Pimania was an extremely successful game when it was issued on the Spectrum — indeed it would probably be rated one of the very best games for the machine.

It is now available for the *Dragon 32* with most of the features of the original including an all singing and dancing PI man, a dreadful single on the reverse side, and of course valuable prize.

Program *Pimania*
Price £10
Micro *Dragon 32*
Supplier Automata
65 Osborne Rd
Portsmouth PO5 3LR

NEW RELEASES

SHOP COPI



percentage derived from the number of written warnings received.

Program *Catcha Snatcha*
Price £5.50
Micro Vic20
Supplier Imagine Software
 Masons Buildings
 Exchange Street East
 Liverpool Merseyside
 L2 3PN

FLASHING SCREEN

Salamander Software has issued a graphics package for the Dragon 32.

The package facilitates use of the Dragon's graphics and enables text to be mixed with high-resolution, as well as various drawing routines.

The program requires one joystick and uses a flashing screen cursor to position lines on the screen.

Program *Graphics System*
Price £9.95
Micro Dragon 32
Supplier Salamander Software
 27 Ditchling Rise
 Brighton
 East Sussex

1K GAMES

Many people who buy a ZX81 lament the fact that there is nothing they can buy for their

machine, unless they also buy the extra 16K Ram.

However, Micromega is a company specialising in games for the 1K machines. *Arcade Action* is a games pack consisting of *Greedy Gobbler*, a maze hunt game, *Extra Terrestrial*, in which you are the stranded alien, and three other arcade type games.

Program *Arcade Action*
Price £4.95
Micro ZX81
Supplier Micromega
 230-236 Lavender Hill
 London SW11 1LE

MEANIE HUNT

Bonka is a game for the Dragon 32 based on the popular *Space Panic* arcade game.

Using the keyboard you must kill off the meanies by trapping them in holes dug with your hammer. There are four speed options, as well as a choice of how many meanies you have to start with.

Bonka is the first of a number of new releases for the Dragon written by John Morrison.

Program *Bonka*
Price £7.95
Micro Dragon 32
Supplier J Morrison (Micros)
 2 Glensdale Street
 Leeds LS9 9JJ

MYSTERY SET

Design and Restore is a program that enables you to create characters for games and foreign languages and *Load and Save* them as you wish.

The program comes complete with already designed characters for *Asteroids*, *Pac-man* and *Robot*, the last being a "mystery set".

Program *Design and Restore*
Price £9.99
Micro Vic20
Supplier Kayde Electronic Systems
 The Conge
 Great Yarmouth
 Norfolk NR30 1PJ

COMING SOON!

Valhalla is an animated graphics adventure whose undisguised intention is to steal the title of "best micro adven-

ture game bar none" from *The Hobbit*.

The 48K Spectrum program, which will be released on July 15, uses a new operating system *MOVISOFT* and boasts a number of *Hobbit*-like features. There are 20 significant characters, each with their own aims and objectives.

You are a minor god set the task of recovering Odin's Golden Helmet. To complete this you will also have to master three lesser tasks, one of which is to rescue *Eiden* — a maiden responsible for the Golden Apples which keep the gods youthful.



The game's designer, Legend, claims that the program involves a sophisticated degree of interaction. For example, should an enemy overhear you telling a friend some important information, he will try to ruin your plans.

Legend stresses that the personality of each of the characters is genuinely independent "as opposed to pseudo-independent behaviour like Thorin sitting down and singing about gold or Gandalf walking off with your door for no reason".

The moving graphics are reportedly of cartoon quality, with both background and foreground movement illustrating the events of the plot.

Pretty impressive claims. *Hobbit* fans will no doubt feel both intrigued and sceptical... Watch this space.

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 19 Whitcomb Street, London WC2 7HF.



Ziggurat



Organising society

"A technology has no value outside of its social significance — alone it is dead metal."

So starts an interesting pamphlet by Paul Strassmann, Vice President of Xerox.

Just published, the pamphlet is a modified version of probably the most successful speech at the IT'82 Conference in the Barbican last December. At the time, the presentation was successful because it was one of the few which actually used information technology to good effect, and because it was one of the most intelligent and intelligible.

The central theme of Strassmann's talk was the productivity of organisations, and how the introduction of information technology can transform the role of people and of organisations. Paul Strassmann's first aim is the analysis of tasks, to examine how sensible automation can benefit productivity and quality. He points out that efficiency is achieved by eliminating many labour-intensive office tasks and he notes that such action will materially enlarge the work of the individuals who remain.

Attention is then turned towards the nature of administrative systems. The traditional structures are being changed — "management is not simple any more". Though the procedures remain the same, management, operations and customers are becoming increasingly diverse. This need to address wider horizons has been met by "adding more standard procedures without altering the traditional organisational concepts of division of labour". The trend towards centralisation and the increase in procedural complexity is measured by what he terms the "Parkinson Ratio" (after C Northcote Parkinson).

Parkinson's Ratio is given by the number of internal communications that are necessary to satisfy a single useful communication to a customer. Paul Strassmann reckons that for a very efficient organisation in a competitive industrial sector, it can take about 20 to 30

internal information transactions to satisfy a single customer enquiry.

In the public sector the average number of transactions is thought to be in excess of 100! The suggested reason is that only highly standardised methods of handling customers are fair and equitable to the public.

Information technology, intelligently applied, can help to reduce Parkinson's Ratio, by reducing the number of needless communications.

Strassmann's first key to information technology is, thus, the need for new forms of organisation made possible by IT. The acquisition of modern technology does not help unless new systems are created to make use of it in ways that are culturally acceptable. Smaller numbers of people will be needed to manage and organise information and this should (can but might not) be used to expand the provision of services.

"The huge coming expansion I see in the demand for information, on a global scale, will come from information being incorporated into socially useful services," says Strassmann optimistically.

Paul Strassmann considers that full employment is possible in productive or unproductive societies, and what matters is the total output of society. If output does not change with automation, then unemployment is produced. Or, to put it the other way, for a growth in output to be achieved, automation is now a necessity.

But what to do with the increased output? Strassmann suggests that the increased output be used to invest in the service sector's effectiveness, and that we should increase "value added" before cutting costs. By value added, he means that improvement investments should be channelled where they will increase value added through new services.

Improved effectiveness of organisations is derived from reduced overhead costs and decreased burdens from over complex administrations.

For maximum benefit, information technology should be used to simplify organisational processes rather than just to mechanise existing office procedures. Eliminating job steps is the key to simplification.

But the vital point is that we must think in terms of "new roles for people in organisations and in the framework of a new social economy based on new services".

The pamphlet by Paul A Strassmann is available from Rank Xerox, 339 Euston Road, London NW1.

Boris Allen

Puzzle

Down on the farm

Puzzle No 57

Within easy walking distance from Lower Muddelcombe, are four farms, Hillop Farm, Cowslip Farm, Dewdrop Farm and Mayfield Farm.

The farmyard of each is in the shape of a right-angled triangle having a perimeter fence of exactly 360 yards in length. Also, all the sides of the farmyards are an exact number of yards.

Curiously, though, the areas of each are different, ranging in size in the order given above, with the largest farmyard at Mayfield.

The other evening the four farmers were enjoying a drink together in *The Bull* when they each made the following statements:

Farmer Giles: My farmyard is the largest.

Farmer Miles: I live at Cowslip farm and have the longest side of all the yards.

Farmer Henry: All of my three fences are an even number of yards.

Farmer Stiles: My farmyard is the smallest.

Unfortunately, none of these statements was true. Who lives where?

Solution to Puzzle No 52

This problem requires us to find 10 primes with a common difference. The lowest prime would represent the number of soldiers sent out on the first day, and the common difference would equal the number of a full regiment. The primes are checked for in the subroutine at Line 300

```
10 LET N = 3
15 LET L = N
20 GOSUB 300
30 IF F < 0 THEN GOTO 140
40 FOR D = 1 + 1 TO INT (N1.1) STEP 2
50 LET M = N
60 FOR T = 1 TO 9
70 LET M = M + D
75 LET L = M
80 GOSUB 300
85 IF F < 0 THEN GOTO 130
100 NEXT T
110 PRINT M, D
120 STOP
130 NEXT D
140 LET N = L + 2
150 GOTO 15
300 LET F = 0
310 FOR B = 3 TO (VAL STR$ SQR L) STEP 1
320 IF L/B = INT (L/B) THEN LET F = 1
330 NEXT B
340 RETURN
```

This gives the results: 210 soldiers in each regiment, but on the first day only 199 soldiers were sent. After 10 days 2,089 men had been sent with 11 held back from the first regiment.

Winner of Puzzle No 52

The winner is: Angus Kerr, Golf Road, Bieldside, Aberdeen, who receives £10.

Top 10

Dragon 32

- (1) The King (Microdeal)
- (2) Space War! (Microdeal)
- (3) Planet Invasion (Microdeal)
- (4) Dragon Trek (Salamander)
- (5) Defence (Microdeal)
- (6) Alcatraz (Microdeal)
- (7) Wizard War (Salamander)
- (8) Chess (Dragon Data)
- (9) Katerpillar Attack (Microdeal)
- (10) Basic Tutorial (Amptech)

*Cartridge (Figures compiled by Boots & Co, London)

Top 10

Spectrum

- (1) Flight Simulation (Pigson)
- (2) The Hobbit (Melbourne House)
- (3) Penetrator (Melbourne House)
- (4) Transylvanian Tower (Richard Shepherd)
- (5) 3D Tanks (ON Tronics)
- (6) Planet of Death (Arcade)
- (7) Horace Goes Skiing (Pigson/Melbourne House)
- (8) Yu-3D (Pigson)
- (9) Sentinel (Abacus)
- (10) Escape (New Generation)

*Requires 48K (Figures compiled by WH Smith and Son Ltd)

Top 10

Atari

- (1) Zaxxon (Datascop)
- (2) Astrochase (First Star)
- (3) Spider Invasion (Com)
- (4) Helical Ace (Microprose)
- (5) Miner 2049er (Big Five)
- (6) AE (Broderbund)
- (7) Pharaoh's Curse (Synapse)
- (8) Survivor (Synapse)
- (9) Canyon Climber (Datascop)
- (10) Protector 2 (Synapse)

*Cartridge, 132K, cassette, 32K disc, 640K disc. (Figures compiled by Caledo Computers, Birmingham 01-632 6458)

Top 10

Vic20

- (1) Panic (Bug-Byte)
- (2) Asteroid (Bug-Byte)
- (3) Cosmids (Bug-Byte)
- (4) Wacky Walkers (Imagine)
- (5) Race (Commodore)
- (6) Arcadia (Imagine)
- (7) Super Expander (Commodore)
- (8) Blitz (Commodore)
- (9) Introduction to Basic Part 1 (Commodore)
- (10) Ampk (Audiogenic)

*Cartridge (Figures compiled by Boots & Co, London)

BBC

- (1) Rocket Raid (Acornsoft)
- (2) Planetoid (Acornsoft)
- (3) Snapper (Acornsoft)
- (4) Monsters (Acornsoft)
- (5) Philosophers Quest (Acornsoft)
- (6) Arcadians (Acornsoft)
- (7) Creative Graphics (Acornsoft)
- (8) Chess (Program Power)
- (9) Meteors (Acornsoft)
- (10) Castle of Riddles (Acornsoft)

*All Model B. (Figures compiled by Micro Management, Ipswich 0473 59181)

Z801

- (1) OS Scramble (Quicksilver)
- (2) Mazogs (Bug-Byte)
- (3) Night Gunner (Digital Integration)
- (4) Flight Simulation (Pigson)
- (5) Monster Maze (New Generation)
- (6) Galaxians (Aric)
- (7) Chess (Pigson)
- (8) Space Raiders (Pigson)
- (9) Avenger (Abacus)
- (10) Asteroids (Silverfox)

*All 16K. (Figures compiled by WH Smith and Son Ltd)

Books

- (1) Spectrum Machine Language for the Absolute Beginner, Tang (Melbourne House)
- (2) Enter the Dragon, Carter (Melbourne House)
- (3) Assembly Language Programming for the BBC Micro, Birmingham (Macmillan)
- (4) Complete Forth, Welford (Sigma)
- (5) Mastering the Vic20, Jones (Sigma)
- (6) The BBC Micro — An Expert Guide, James (Granada)
- (7) 280 Assembly Language Programming, Leverahl (Osborne)
- (8) Visual Programming Reference Guide, Commodore (Commodore)
- (9) Computer's First Book of Vic, various authors (Computat)
- (10) Commodore 64 Programmer's Reference Guide, Commodore (Commodore)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

AUTOMATA U.K.LTD. "WE FIGHT THE TICS IN POLITICS"

VOTE PIMAN

HOUSING - Everyone who votes for us has the chance to own their own homes, own hotels and own city! (Play "AUTOMONOPOLI", but beware, your Spectrum may win.)

EDUCATION - We will free your mind from the shackles of boring programs, and make you think. (Play "PIMANIA" and use our graphics-teaching-programs "DRAGON DOODLES & DENCES" plus "SPECTRUM SPECTACULAR")

UNEMPLOYMENT - In the last year, 50% more jobs have been created at Automata, there are now three of us.

EQUAL OPPORTUNITIES - Our programs are for the enjoyment of all, regardless of sex, age, species or galaxy. Equal rights for aliens, monsters, dwarves, dragons & pacpersons.

INFLATION - We have held down all our software prices, & they now include VAT, packaging and postage within the U.K.

DEFENCE - All our programs are NON-VIOLENT, we don't sit on defence. If you want to kill, conquer, bomb, maim, slay or destroy - vote for some other party. (Play "BUNNY" plus "E.T.A." games for the peaceful and young at heart.)

INCENTIVE TO WORK - The winner of our celebrated "PIMANIA" will be rewarded with the £6,000 gold and diamond Sundial of Pi. (And no one's won it yet!)

SOCIAL SERVICES - We believe that everyone has the duty to be silly within the privacy of their own home. (Play "BEST POSSIBLE TASTE", 30 wonderfully silly games for a fiver.)

JOIN THE PIMANIACS...THE ONLY SENSIBLE WAY TO VOTE THIS ELECTION



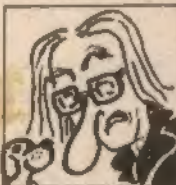
MARGARET TASKFORCE
leader of the BLITZEN
HARDWARE PARTEI.
"Ve haiff vays of
making you asp aliens"



DAVID DUFF-
SINCLAIR leader
of the LIBRIUM
SOFTWARE PARTY
"We'll deliver...
sooner or later."



ROY MONOCHROME
SLEEK leader of
the NOTHING-IN-
PARTICULAR PARTY
"our software is
...um, ah, hic."



MICHAEL BOFFIN
leader of the
CARTHORSE PARTY.
"We need a return
to traditional pro-
gramming...yawn."



THE PIMAN

LEADER OF THE PIMANIA PARTY
"I PROMISE TO DO MY BEST TO ENTER-
YOU, GIVE YOU VALUE FOR MONEY, &
TO PUT SOME TING IN COMPUTING...
VOTE FOR ME."

ORDER FORM all prices include VAT,
packing & postage within the U.K.
"please send me these cassettes...
3 enclose the right money....."

MY NAME

MY ADDRESS

.....POST CODE.....

	TICS
AUTOMONOPOLI 48K Spectrum	£6
PIMANIA 48K Spectrum	£10
PIMANIA 32K BBC	£10
PIMANIA 32K Dragon32	£10
PIMANIA 16K ZX81	£5
BUNNY + ETA any Spectrum	£5
BEST POSS. TASTE 16 ZX81	£5
DRAGON DOODLES Dragon32	£5
SPEC. SPECTACany Spectrum	£5

TOTAL:

send to AUTOMATA UK LTD.,
65 OSBORNE RD., PORTSMOUTH,
HANTS., PO5 3LR, ENGLAND.

VOTE PIMAN

